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ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

1895.

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No. 97.] JANUARY. [1895.

CCCCXXXII.—FORESTRY IN NATAL.

A translation of a paper from the *Forst und Jagd Zeitung* by Sir Dietrich Brandis, K.C.I.E., F.R.S., formerly Inspector-General of the Indian Forest Department, is contributed to *Nature* for January 3rd, by Mr. W. R. Fisher, B.A., Assistant Professor of Forestry at the Indian Civil Engineering College at Cooper's Hill.

It gives a very complete account of the position of forestry in this part of South Africa. The Colony appears to have made a good start in the direction of ascertaining the deficiency in its resources in regard to timber, and also to have established nurseries with the object of planting up waste lands in the neighbourhood of its principal towns. After a very brief period of activity it has suddenly abandoned the enterprise. The officer in charge has relinquished his post, and the plants in the State nurseries were to be sold.

FORESTRY IN NATAL.

Natal lies between latitude 28° and 31° S. The climate of the coast is almost tropical, owing to a warm current from the equator. Mangrove trees grow along the coast, and sugar-cane and tropical Indian fruit trees are cultivated there. The land ascends rapidly inland, and the capital, Pietermaritzburg—or Maritzburg, as it is usually called, at 50 miles from the coast—is at 2275 feet above sea-level, and possesses an appreciably mild climate.

The Colony is bordered on the west by the Kathlamba or Drakensberg, a mountain chain attaining altitudes which exceed 9600 feet, and separating Natal from the Transvaal, the Orange Free State, and Basuto-land. These mountains form the eastern boundary of the high South African plateau, which is drained by the Orange River and its tributaries.

Natal is scantily populated, containing 18,755 square miles, with 532,000 inhabitants, of whom 38,000 only are Europeans. Most of the latter are English who came by sea and founded Port Durban, but a few are descended from the Dutch Boers who came from the west in 1838-42 and founded Maritzburg. Natal has been an English colony since 1843, when the territory only included 3000 native inhabitants, but their numbers rose rapidly to 100,000 in 1845, and to 400,000 in 1883. They are mostly Zulus in the north, and Kaffirs in the south of the Colony.

Much greater progress could have been made in Natal, in trade, agriculture, and manufactures if it had been connected by roads and railways with the Transvaal and Orange States. The Cape railway, 650 miles long, from Cape Town to Kimberley, with express trains doing the distance in 36 hours, has long been constructed, and in 1893 this railway was extended to the Transvaal gold mines at Johannesberg.

In 1880 a railway was constructed from Durban to Maritzburg, but only recently has it been pushed further inland, and it now reaches the confines of the Colony. Its further extension to Johannesberg is most important for the future prosperity of Natal. About one and a half years ago a railway was made from Ladysmith in Natal to Harrismith in the Orange State. Natal is at present short of funds, and this may partly explain why, having made a good start in forest conservancy, the Colonial Government has not had the resolution to persevere in it.

The Cape Colony has had for some time a good forest administration which was organised by a French forest officer, Count Vasselot de Regné, Conservator of Forests in Algiers, and Mr. D. E. Hutchins is now Chief Conservator of Forests at Cape Town. He was trained at Nancy for the Indian forest service, and left it for service at the Cape in 1883. Mr. Fourcade, of the Cape forest service, was employed in Natal for nine months in 1889, and has written a very valuable paper on the Natal forests, but he declined to quit the Cape service permanently for that of Natal, and was succeeded in 1891 as chief forest officer there by Mr. Schöpflin, a Baden forest officer.

The work he undertook of organising a forest department in Natal was full of difficulty, especially as the forest revenues were not expected to cover the expenditure for a number of years. Irrespectively of the continual clearance of forests for the extension of agriculture, forest fires, unregulated grazing, and wasteful timber felling have so exhausted the Natal forests that the areas still covered with brushwood and forest are widely scattered over the country, and only a small per-centage of them is still State property.

From the coast to altitudes of about 975 feet, with an average annual temperature of 67°–71°, the forest consists of numerous species belonging to the tropical flora. The woods are not more than 30–60 feet high, but something might be made of them, as several species yield valuable timber. Unfortunately nearly all the coast forests are now private property.

In a central zone ranging in altitude between 980 and 3450 feet, with an average annual temperature of 59°–67° F., extensive tracts are covered with so-called mimosa scrub, formed of several species of *Acacia*; these woods are very thinly stocked, and contain a tall grass undergrowth. The acacias bear plenty of seed, and young growth exists, but is continually being destroyed by the annual grass fires. If only protection could be afforded to these forests against fire, as has been done for the last 30 years in British India, they could be worked profitably with short rotations—24 years, according to Mr. Fourcade; it is, however, probable that most of this area will be cleared for agriculture.

The present area of the coast and acacia forests is estimated at 196,000 acres of State forest, and 1,645,000 acres in private hands.

In the higher zone, from 3450 feet up to 9600 feet, with a temperate climate, and an average annual temperature of 52°–59°, the most valuable forests are situated, but they are scattered over a difficult mountainous region. Of these forests, the State possesses 54,000 acres, and 27,000 acres are in a territory assigned to the indigenous inhabitants of the country. The Government has decided that in the mountains the action of the Forest Department will be restricted to the State forests. They contain many species; *Podocarpus Thunbergii* and *P. elongata*, both known as yellow-wood, are the commonest, and their wood resembles that of the European spruce. At present the great cost of transport prevents the profitable working of yellow-wood. Amongst the remaining species, the two most valuable trees are stinkwood (*Ocotea bullata*), so named on account of the bad odour of freshly-sawn wood, an evergreen lauraceous species with a beautiful brown heart-wood, which is hard and tough; and sneeze-wood, *Pteroxylon utile*, an ally of the horse-chestnut. These woods are also highly esteemed in the Cape Colony, especially for cart and waggon making, and can be worked at a profit even from these remote mountain forests. Unfortunately these two species are only found here and there in the forests, and there is no large supply of them.

In the year 1891–92, the sale of wood by the Natal Forest Department yielded 725*l.*, while the expenditure was 1,942*l.*, partly for establishment and partly for the survey of the forests. Owing to the small area of forests available, and the remote position of the State forests, Mr. Fourcade strongly recommended that plantations should be started near the towns and railways. Past experience with the blue gum (*Eucalyptus Globulus*) is favourable for the success of this tree in Natal. At Arambi, near Ootacamund in the Nilgiri Hills in India, this tree attains a height of 107 feet in 19 years, and yields 8696 cubic feet per acre. This enormous production of 457 cubic feet per acre annually was attained in latitude 11° N. at an altitude of 7426 feet above sea-level.

In the higher latitude of Natal, a similar climate to that of Arambi is found at 2275 feet above sea-level, and, according to Mr. Fourcade, mixtures of *Eucalyptus Globulus, longifolia*, and *rostrata* give an even higher yield near Maritzburg than at Arambi. Mr. Schöpflin doubts whether this will be the case; but, at any rate, the gum-trees will give a large yield, and if the wood were only fit for fuel a considerable pecuniary return would be obtained. Several of the gum-trees, however, yield splendid timber, and especially *E. rostrata*, the red gum of Southern Australia.

Timber imports into Natal average in value 180,000*l.* a year, so that, as the indigenous forests are small, much sub-divided, and unfavourably situated, the State is clearly called upon to plant up a sufficient area of the State lands. Mr. Fourcade states that the land necessary for these plantations can now be purchased cheaply, and Mr. Schöpflin commenced planting operations. This useful measure is now abandoned, owing to want of funds, and the plants in the State nurseries will be sold.

Besides *Eucalypti*, several Australian acacias succeed admirably in Natal, especially *A. decurrens* and *mollissima*; their bark is rich in tannin, and a plantation of 1,200–1,500 acres of these trees has been started by a private company. Near the neighbouring Transvaal goldfields, Australian trees are being planted on a large scale to supply mine-props.

The length of rails in Natal is about 625 miles, and the mountain forests will yield a portion of the necessary railway sleepers. Yellow-wood must be kyanised, as has been done in the Cape Colony, and kyanising works can easily be established in Natal, and wood from gum-tree plantations ought to supply the balance of the sleepers required.

It is evident that Natal cannot possibly prosper without a Forest Department, and the Colony will have cause to regret having abandoned the attempt to form one, after such an excellent beginning has been made. The Government wished to retain Mr. Schöpflin's services up to March 31, 1894, but would not undertake to employ him after that date. Under these circumstances, he was obliged to resign his appointment last September, in order to return to the Baden forest service.

The following note was prepared for publication in a Kew Report some years ago. The state of things described is not likely to have improved, or to have made some measure of forest conservation less necessary :—

The forests are distinguished as of two kinds, light timber and heavy timber. The former consists of "thorn" or Mimosa, and yields wood principally used for fuel, and to some extent for waggon-making, &c. It occupies "a belt of land about 30 miles in width, extending along, but about eight miles distant from the coast-line." The heavy timber is mostly found on the mountain slopes, in the interior of the Colony.

According to the Colonial Timber Returns in 1878 the area of forest land was largely diminishing. There was formerly a considerable export of sawn timber to the Orange River Free State and the Transvaal. This had almost entirely ceased, and a large amount of timber for building purposes was imported into the Colony.

A Commission was appointed by the Natal Government to inquire generally into the conditions of the forests and woodlands of the Colony. This reported in 1880.

The general drift of the evidence printed by the Commission points to a progressive destruction of the forest. Thus, "Mr. James Ralfe says :—'I consider that one-third of the wood has been destroyed since I first (25 years ago) knew this part of the Colony.'" (p. 11.)

"For many years after the settlement of the Colony the portion of forest lands belonging to the city of Pietermaritzburg yielded timber fit for buildings, waggons, &c. About 20 years ago the supply dwindled down to only firewood, which the citizens had the right to remove, upon payment of 1*s*. 6*d*. per waggon-load of probably two tons weight.

"There being no attempt at conservation of any kind, a very few years sufficed for the entire destruction of the forest growth ; and although nearly 20 years have passed away since under severe prohibitory regulations, the situations occupied by the heavy timber have been protected, scarcely any signs are present of the spontaneous return of the noble trees which the intelligence of the municipality had not seen fit to protect." (p. 13.)

"The evidence laid before the Commission respecting the condition of forests on private lands, points generally to the same reckless waste as in the forests on the Crown lands. Both the European owners and their native servants and tenants appear to have almost entirely disregarded all precautionary measures for the preservation of the timber and its economical application in the supply of Colonial necessities. Nor has it occurred to any of the numerous owners of forest lands to plant out either indigenous trees, or trees of any kind, on the patches of land that have in course of many years been denuded. The owners of forest lands, desirous of in every way possible encouraging their native servants to reside on their lands, have avoided the imposition of restrictions that would be antagonistic to their customs as regards freed and domestic work. They enjoyed the run of the forest for planting purposes, more especially as the crops in the forest clearings were more or less safe from the trespass, during the night, of the landlord's cattle."

"The natives everywhere are viewed as the natural antagonists of the forests. In the construction of each of their ordinary huts from 500 to 1000 saplings are required. In the palisading of their kraals for their cattle, the proportion is even greater than that required for their huts." (p. 8.)

The natives "creep slowly, it may be, but withal most effectually, into the forests, destroying trees that may each contain timber to the value of 50*l.*, and be the growth of over two hundred years. This destruction is effected simply by the native women removing the bark from a very short section of each tree, as near the ground as may be convenient, and shortly thereafter, with a brushwood fire it is felled, crushing many a beautiful and promising sapling in its descent." (p. 9.)

In Newcastle county "fuel is abundant from the coal deposits." (p. 19.)

The evidence as to any permanent deterioration of the climate is conflicting. The general belief is that there has been a decrease in the rainfall. Rivers have become dry for lengthened periods, which however does not imply necessarily a diminished rainfall. The Commission recommended that the services of a forest officer should be secured; but the Government did not seem disposed to take any immediate action.

CCCCXXXIII.—NEW ORCHIDS. DECADE 12.

111 **Cryptophoranthus minutus**, *Rolfe;* planta minuta, caule abbreviato v. subnullo, foliis orbicularibus apiculatis basi in petiolum brevem attenuatis, floribus breviter pedicellatis, bracteis ovatis apiculatis, sepalis puberulis in tubum oblongum connatis lateribus fenestratis, petalis spathulatis, labello cordato - hastato obtuso minutissime denticulato bicarinato, columna clavata apice alata.

HAB.—Not known.

Folia 5 lin. longa, 2½ lin. lata. *Pedunculi* 3 lin. longi. *Bracteæ* 1 lin. longæ. *Sepala* 2½ lin. longa; fenestræ 1 lin. longæ. *Petala* 1 lin. longa. *Labellum* 1¼ lin. longum. *Columna* 1¼ lin. longa.

A minute species, which flowered with Mr. J. O'Brien in November 1891. It is far smaller than any other yet known in the genus, being little over half an inch high, and the flowers very large for the size of the plant. Their colour is deep maroon-purple. It seems most allied to *C. punctatus*, Rodr. (Gen. et Sp. Orch. Nov., II., p. 80), of which the dimensions are not given, but the colour of the flowers is very different.

112. **Cryptophoranthus oblongifolius**, *Rolfe;* caulibus teretibus foliis brevioribus vaginis infundibuliformi-tubulosis striatis apice obliquis acutis, foliis elliptico-oblongis subobtusis viridibus, pedunculis brevibus erectis, bracteis tubulosis apice obliquis acutis, floribus pendulis, ovario 9-angulato angulis subalatis, sepalo postico lanceolato-oblongo acuto leviter carinato lateralibus alato-carinatis, petalis quadrato-oblongis apice retusis apiculatis v. subtridentatis trinerviis, labello

breviter unguiculato sagittato-cordato acuto v. apiculato, ungue medio tuberculum carnosum erectum ferente, columna clavata.

Hab.—Andes of South America.

Caules 1½–2 poll. longi. *Folia* 1¾–3 poll. longa, ¾–1 poll. lata. *Pedunculi* ¾ poll. longi. *Bracteæ* 3 lin. longæ. *Sepala* 10-12 lin. longa, 3½ lin. lata; fenestræ 3 lin. longæ. *Petala* 2 lin. longa. *Labellum* 2¼ lin. longum. *Columna* 1½ lin. longa.

A wild specimen of this species was presented to Kew in August 1889, by Mr. J. Charlesworth, of Heaton, Bradford, who had collected it in some part of the Andes of South America, not precisely indicated. In November 1894, a specimen was sent from Glasnevin, by Mr. F. W. Moore, A.L.S., for determination, which apparently belongs to the same species, though the leaves and flowers are a little smaller, the nerves of the petals rather stronger, and the tubercle at the base of the lip rather less developed. In other respects it agrees well with the dried specimen. It is allied to the West Indian *C. atropurpureus*, Rolfe, but the flowers are structurally different, and veined with maroon-purple on a dull yellow ground.

113. **Microstylis macrochila**, *Rolfe;* foliis petiolatis oblongo-ovatis acutis undulatis, scapis erectis glabris multifloris, bracteis oblongo-lanceolatis acutis reflexis, sepalo postico oblongo-lineari subobtuso lateralibus falcato-oblongis obtusis ad medium connatis, petalis linearibus obtusis, labello orbiculari basi profunde cordato apice fimbriato-dentato, columna brevissima bidentata.

Hab.—Malaya.

Folia 3–4½ poll. longa, 1¾–2¼ poll. lata. *Scapus* 6–8 poll. longus. *Bracteæ* 2–4 lin. longæ. *Pedicelli* 5–6 lin. longi. *Sepalum* posticum 6 lin. longum, 1 lin. latum; lateralia 4 lin. longa, 1½ lin. lata. *Petala* 6 lin. longa. *Labellum* 6 lin. longum. *Columna* ½ lin. longa.

This handsome *Microstylis*, the largest-flowered species yet known, flowered in the collection of Sir Trevor Lawrence in May 1894. The leaves are almost identical with those of *M. Scottii*, Hook. fil. (Bot. Mag., t. 7268), for which it was purchased, and no difference was detected until it flowered. The flowers, however, are many times larger than in that species, and very different in colour. The sepals and petals are light yellowish green, the lateral sepals being a little suffused with dull purple at the tip, and the large lip deep red-purple. The leaves are light yellowish brown with an irregular marginal band of lighter colour. It presumably grows with *M. Scottii*, of which a large number of plants were imported about a year ago, though there is some doubt about the precise locality. It is believed, however, to have come from Pulau Aar, a small island just off the east coast of Johore. It is remarkably distinct.

114. **Dendrobium inflatum**, *Rolfe;* caulibus gracilibus teretibus subflexuosis, foliis oblongis obtusis v. minute bidentatis, racemis terminalibus paucifloris, bracteis oblongo-lanceolatis acutis, sepalo postico ovato-oblongo obtuso, lateralibus triangulo-ovatis basi cum pede columnæ in mentum amplum inflatum obtusum extensis, petalis oblongis obtusis, labello obovato-spathulato obtuso crenulato undulato ecalloso, columna brevissima.

Hab.—Java.

Pseudobulbi 5–6 poll. longi. *Folia* 9 lin. longa, 2½ lin. lata. *Racemi* 6 lin. longi. *Bracteæ* 2 lin. longæ. *Pedicelli* 9–10 lin. longi. *Sepalum* posticum 5 lin. longum, 2½ lin. latum; lateralia 10 lin. longa, 4 lin. lata. *Petala* 5 lin. longa, 1½ lin. lata. *Labellum* 10 lin. longum, 6 lin. latum. *Columna* 2 lin. longa. *Mentum* 7 lin. longum.

A distinct and pretty little species which was introduced by Messrs. Linden, L'Horticulture Internationale, Brussels, and flowered in their establishment in June 1894. It belongs to the section *Pedilonum*, and is allied to *D. auroroseum*, Rchb. f., which, however, is a larger plant altogether, with acute leaves and large differently coloured flowers. *D. inflatum* has relatively large white flowers, with a yellow line down the centre of the column-foot, a yellow blotch near the apex of the lip, and a faint rose-purple stain on the unguis.

115. **Bulbophyllum disciflorum**, *Rolfe;* pseudobulbis late ovoideis monophyllis, foliis lanceolato-oblongis acutis crasso-carnosis canaliculatis basi attenuatis, scapis brevibus uni-paucifloris, floribus magnis, sepalis subcarnosis basi connatis oblongo-ovatis acutis lateralibus ad medium connatis, petalis basi sepalorum adnatis erectis linearibus acutis, labello oblongo obtuso planiusculo verruculoso basi late canaliculato lobis lateralibus parvis erectis apice subobtuso, columna subtereti apiculata dentibus obsoletis mento subhemisphærico obtusissimo.

HAB.—Laos, Siam.

Pseudobulbi ¾ poll. longi. *Folia* 4–5 poll. longa, 12–13 lin. lata. *Sepala* 1 poll. longa, 6–7 lin. lata. *Petala* 4 lin. longa, ¾ lin. lata. *Labellum* 9 lin. longum, 4 lin. latum. *Columna* 4 lin. longa. *Mentum* 5 lin. longum.

A remarkable species introduced by Messrs. Linden, L'Horticulture Internationale, Brussels, and flowered in their establishment in October last. It is peculiar in having the base of the sepals united into a flat disc, to which the petals are adnate at the base. Thus the petals appear to arise from a broad disc, above which they stand quite parallel to each other and about two lines distant from the column on either side. The name is given in allusion to this character. The sepals are densely covered with small red-brown dots on a light greenish yellow ground; the petals semipellucid white with a red-brown mid-nerve, and some similar marginal dots, and the lip almost wholly covered with minute purple-brown warts which nearly obliterate the paler ground colour; column light yellow with a green apiculate anther.

116. **Cirrhopetalum whiteanum**, *Rolfe;* rhizomate repenti valido, pseudobulbis oblongis tetragonis monophyllis foliis elliptico-oblongis obtusis rigide coriaceis, scapis erectis vaginis laxis tectis apice nutantibus multifloris, floribus capitato-congestis, bracteis lineari lanceolatis acutis concavis, sepalo postico ovato acuto ciliato lateralibus longe caudato-attenuatis glabris, petalis oblongis subobtusis ciliatis trinerviis, labello recurvo oblongo acuto, columna brevissima dentibus brevibus.

HAB.—Moluccas (?)

Pseudobulbi 4–6 lin. longi. *Folia* ¾–1¼ poll. longa, 5–7 lin. lata. *Scapi* 3 poll. alti. *Bracteæ* 4–6 lin. longæ. *Pedicelli* 1½ lin. longi. *Sepalum* posticum 3 lin. longum, lateralia 1½ poll. longa. *Petala* 1 lin. longa. *Labellum* 1 lin. longum.

A small species allied to *Cirrhopetalum vaginatum*, Lindl., but with pseudobulbs and leaves scarcely half as large as in that species, and the pseudobulbs much closer together on the rhizome. It was received from Mr. J. O'Brien, with the information that it was found "growing "on roots of *Vanda stangeana*, said to have come from the Moluccas." There seems to be a little doubt about the habitat. *Vanda stangeana*, Rchb. f., was described from a garden plant said to have been imported from Assam, but little or nothing is known about it beyond the original description. The flowers of *C. whiteanum* are light straw-yellow with a bright yellow lip.

117. **Megaclinium imschootianum**, *Rolfe;* pseudobulbis acute trigonis oblongis monophyllis, foliis lineari-oblongis obtusis, scapis foliis longioribus, rachi compressa lineari-oblonga crenulata inæquilaterali, bracteis lanceolatis acutis reflexis, sepalo postico lanceolato-oblongo apice acuminatissimo recurvo, lateralibus late ovatis apice acuminatissimis reflexis, petalis falcato-lanceolatis breviter acuminatis, labello recurvo carnoso lineari-oblongo obtuso infra medium margine serrulato, columna brevi latissime alato dentibus brevibus et latis.

Hab.—Not known, but probably tropical Africa.

Pseudobulbi 1¾ poll. longi, 8 poll. lati. *Folia* 6 poll. longa, 1¼ poll. lata. *Scapi* 10 poll. longi; rachis 6 lin. lata. *Bracteæ* 3 lin. longæ. *Pedicelli* 1½ poll. longi. *Sepalum* posticum 5 lin. longum, 1 lin. latum; lateralia 4 lin. longa, 2½ lin. lata. *Petala* 1¾ lin. longa. *Labellum* 2 lin. longum.

This was received from M. A. Van Imschoot, of Mont-St.-Amand, Gand, in July last. It is allied to *Megaclinium oxypterum*, Lindl., in which the flowers are much more crowded, and situated in the centre of the rachis, while in the present one they are in a line much nearer to the lower margin; besides being different in structure. The rachis is light green, with numerous minute black dots near the margin. The flowers are light yellowish green, with the reflexed tips and margins of the sepals dusky brown and a few similar spots near the apex, the petals spotted and marbled with the same colour, the lip minutely spotted all over, and the wings of the column less distinctly spotted with dusky brown.

118. **Maxillaria sanguinea**, *Rolfe;* caulescens, rhizomate valido vaginis imbricatis tectis, pseudobulbis ellipsoideo-oblongis subcompressis, foliis elongato-linearibus angustis subacutis, floribus breviter pedunculatis, bracteis ovatis apiculatis, sepalis oblongis subobtusis, petalis lineari-oblongis subobtusis, labello subintegro oblongo obtuso callo lineari nitido, columna clavata.

Hab.—Chiriqui, Central America.

Pseudobulbi ½–1 poll. longi. *Folia* 10–15 poll. longa, 2 lin. lata. *Pedunculi* ¾–1 poll. longi. *Bracteæ* 3 lin. longæ. *Sepala* 6–8 lin. longa, 2–2½ lin. lata. *Labellum* 6–7 lin. longum, 3 lin. latum. *Columna* 6 lin. longa.

A distinct and very pretty species belonging to the group *Caulescentes*, and allied to *M. tenuifolia*, Lindl. It was sent from the neighbourhood of the Chiriqui Lagoon, to Mr. J. O'Brien, with whom it flowered in April 1890. Plants were distributed to Kew, Glasnevin, and one or two private collections, where they have since flowered. The sepals are dull reddish brown with yellow tips, the petals pale yellow spotted and marbled with red-brown, and the lip carmine or purple-crimson, with a blackish purple crest.

119. **Oncidium panduratum,** *Rolfe*; pseudobulbis oblongis subcompressis, foliis lineari-oblongis subobtusis, scapis suberectis ramosis ramis brevibus multifloris, bracteis ovato-oblongis subacutis, sepalis petalisque oblongis subacutis crispo-undulatis, labello pandurato lobis lateralibus parvis suberectis rotundato-oblongis crenulatis intermedio reniformi-ovato apiculato crenulato isthmo quadrato-oblongo nitido, callo oblongo depresso obscure tricarinato verrucoso, columna brevi aptera.

HAB.—Columbia; *Millican.*

Pseudobulbi 4 poll. longi, 2 poll. lati. *Folia* 10–12 poll. longa, 1½–1¾ poll. lata. *Scapi* 1½–2 ped. longi. *Bracteæ* 3–4 lin. longæ. *Pedicelli* 8–9 lin. longi. *Sepala* 7–8 lin. longa, 2½ lin. lata. *Petala* 7–8 lin. longa, 3 lin. lata. *Labellum* 4½ lin. longum, 3 lin. latum; isthmus 1¾ lin. latus. *Columna* 1½ lin. longa.

A very distinct species, belonging to the section *Hymenoptera obsoleta*, recalling *O. anthocrene*, Rchb. f., but with smaller and more numerous flowers, and further differing from every other species of the group in the shape of the lip. It was collected by Mr. Albert Millican and sent home with Odontoglossums in 1891. A plant flowered in the collection of Welbore S. Ellis, Esq., Hazelbourne, Dorking, in October last. The flowers are deep reddish brown, the sepals being margined with yellow on their upper parts, and the small lobes of the lip also yellow, while the larger isthmus is bright shining brown. The crest consists of three dwarf fleshy parallel keels, which are slightly verrucose.

120. **Sarcanthus auriculatus,** *Rolfe*; foliis lineari-oblongis inæqualiter bilobis, racemis gracilibus arcuatis multifloris, bracteis minutis triangulo-ovatis acutis, sepalis ellipticis obtusis patentibus, petalis incurvis concavis paullo minoribus cæteris similibus, labello trilobo lobis lateralibus auriculatis valde concavis minute crenulatis angulis internis in dentem erectam productis intermedio recurvo triangulari-oblongo obtuso, disco lævi, calcare oblongo obtuso, columna brevissima.

HAB.—Not known.

Folia 2½–6½ poll. longa, 6–10 lin. lata. *Racemi* ½–1 ped. longi. *Bracteæ* ½ lin. longæ. *Pedicelli* 3 lin. longi. *Sepala* 2½ lin. longa, 1¾–2 lin. lata. *Petala* 2 lin. longa, 1½–1¾ lin. lata. *Labelli limbus* 2 lin. longus, 2 lin. latus; *calcar* 2 lin. longum. *Columna* 1¼ lin. longa.

This was sent to Kew by Mr. J. O'Brien in June 1890, and on two other occasions It has the general habit of *S. Parishii*, Rchb. f., but it is quite different in the structure of the flower; and there does not appear to be any described species having the same remarkable auriculate side lobes. The flowers are very pale green or greenish white, with a purple line on each of the sepals and petals, and some purple marblings on the lip.

CCCCXXXIV.—AGRICULTURE IN BRITISH HONDURAS.

In continuation of previous information on this subject (*Kew Bulletin*, 1894, p. 97), the following extract is taken from the Annual Report for 1893 (*Colonial Reports*, Annual, No. 116, 1894) on the agricultural resources of British Honduras. It is noticed by the Governor that a valuable impetus has been given to the cultivation of fruit for export by the organisation of a new steamship company by local capitalists. Already, owing to this cause, increased applications have been made for the purchase or lease of Crown lands, and better facilities are afforded for the disposal of agricultural produce :—

The principal products of the Colony, in addition to mahogany and logwood, are sugar, rum, Indian corn, bananas, cocoanuts, and plantains, and, according to the returns supplied, the quantity produced during 1893, and in the case of bananas, cocoanuts, and plantains, the quantity exported for the same period, are as follows: sugar, 1,490,920 lbs.; rum, 57,178 galls.; Indian corn or maize, 47,607 bushels; bananas, 189,420 bunches; cocoanuts, 1,177,315; plantains, 506,400 fruits. The returns for sugar, rum, and Indian corn cannot, however, be considered as strictly accurate, and probably are very much below the actual quantity produced.

Under bananas, cocoanuts, and plantains only the quantity exported has been given, as no reliable figures could be obtained as to the quantity grown. In endeavouring, therefore, to arrive at an approximate estimate of the bunches of bananas and the number of cocoanuts and plantains annually produced in the Colony, a reasonable allowance must be made for home consumption by a population of nearly 33,000 souls. There is a very considerable decrease in the quantity of bananas, cocoanuts, and plantains exported in 1893 as compared with the four previous years, but this decrease is almost entirely attributable to the disastrous effects of the gale of the 6th of July, which wrecked or very seriously damaged nearly all the plantations in the southern districts of Stann Creek and Toledo. Considering the geographical position of British Honduras, the fertility of its soil, and the general salubrity of its climate, it is surprising that the number of its agricultural products as articles of commerce is not greater than it is. By the establishment, through the efforts of his Excellency Sir Alfred Moloney, K.C.M.G., in 1892, of a Botanic Station at Belize attached to the grounds of Government House, an attempt has been made to create a nursery for the cultivation of plants of economic value of all kinds. But the condition of the soil in Belize and the proximity of the station to the sea have proved the present site to be not altogether suited for its purpose, and it is hoped to shortly transfer the Botanic Station to the Stann Creek district, where a site of some 75 acres, admirably adapted for its purpose, has been generously placed at the disposal of the Government by the board of directors of the British Honduras Syndicate. Even at Belize the Botanic Station has proved of value, for, from the experiments made there, and from experience gained of the resources and capabilities of the Colony, it seems clear that the following products, in addition to those which have already proved successful, can be grown with advantage and with profit to agriculturists: cacao, castor-oil plant, coffee (*liberica* for the lowlands, *arabica* for the highlands), rubber (*Castilloa elastica*), *Cola acuminata*, cotton, grape-fruit, ground nut, henequen, jute, lemon, lime, nutmeg, pine-apple, pimento, sapodilla, shaddock, tobacco, and vanilla. In addition to the above, the following kitchen-garden products, as they are generally termed, can be readily cultivated: artichoke (Jerusalem), asparagus, beans of various kinds, cabbage, carrot, cauliflower, celery, corn, cucumber, edible gourds, Indian kale, lettuce, melon, mint, ochro, parsley, potato (Irish and sweet), peas, spinach, and tomatos.

Bearing in view the short-sighted policy of depending on logwood and mahogany as the staples for the Colony's trade, it is to be hoped that the oft-repeated exhortation of his Excellency the Governor that the future of British Honduras must depend on its agricultural development will be borne in mind, and that in time this Colony will become, what it is eminently fitted by its climate and fertility to be, the garden of Central America.

CCCCXXXV.—GOLD COAST BOTANIC STATION.

The progress made in establishing a Botanic Station at Aburi on the Gold Coast has been noticed in the *Kew Bulletin.* The site is in the hills, at an elevation of about 1400 feet, overlooking the sea-board, near Accra and Pram Pram. In addition to its suitability for the growth of economic plants Aburi is a valuable sanatarium for European invalids. The locality has been greatly improved of late years, and it promises to become the centre of activity for many cultural industries started by the Botanic Station. The progressive development of the station is described in the *Kew Bulletin*, 1891, p. 169; 1892, pp. 14 and 297; 1893, pp. 160 and 365. During the winter of 1893–94 Mr. William Crowther, the curator (appointed in 1890), was deputed to visit the West Indies "to observe the system pursued there in the cultivation of "economic plants, and to bring back such useful seeds and plants as "might with advantage be introduced to the Gold Coast." Mr. Crowther very successfully carried out the object of his mission and published a detailed report (*Kew Bulletin*, 1894, p. 227). Since then the work of the Aburi Station has made excellent progress. The inception, as well as the actual work, so far accomplished in botanical enterprise at the Gold Coast is entirely due to the Governor, his Excellency Sir William Brandford Griffith, K.C.M.G. He has given warm and consistent support to the station and personally encouraged in every way the efforts of the curator.

The most recent information is contained in the following correspondence. In this an account is given of a recent visit made to the station by Mr. A. M. Ashmore, an officer of the Ceylon Civil Service, lately Acting-Colonial Secretary at the Gold Coast :—

COLONIAL OFFICE to ROYAL GARDENS, KEW.

Downing Street, 14th December 1894.

SIR,

I AM directed by the Marquess of Ripon to transmit to you, for your perusal and for any observations you may have to offer, a despatch from the Governor of the Gold Coast Colony, with its enclosure, respecting the Botanical Station at Aburi.

I am, &c.
(Signed) JOHN BRAMSTON.

The Director,
Royal Gardens, Kew.

GOVERNOR OF THE GOLD COAST to COLONIAL OFFICE.

Government House, Cape Coast Castle,
20th November 1894.

MY LORD,

BEING desirous of having the Botanical Station at Aburi inspected by an officer of experience, towards the end of last month

I requested Mr. Ashmore, the Acting-Colonial Secretary, who has seen a good dead of the cultivation of coffee in Ceylon, to undertake this duty, and I have now the honour to forward, for your Lordship's information, a copy of his interesting report upon the Aburi plantation, and would suggest that Mr. Thiselton-Dyer, C.M.G., should be allowed to peruse Mr. Ashmore's paper, as I think it would interest him to see what the former states with regard to an undertaking in which the Director of the Royal Gardens at Kew has always taken a strong and kindly interest, and the advancement of which he has done so much to promote.

*　　*　　*　　*　　*　　*

3. The coffee pulper recommended by Mr. Ashmore has been sent for.

I have, &c.
(Signed) W. Brandford Griffith,
Governor.

The Most Honourable
The Marquess of Ripon, K.G.,
&c. &c.

(Enclosure.)

Report by the Acting-Colonial Secretary on his Inspection of the Botanical Station at Aburi.

Started from Accra for Aburi, Sunday, 28th instant, at 7.45 a.m. Arrived at Aburi, after walking up from the foot of the hill, between 4 and 5 p.m.

The road up to Teimang from Christiansborg requires remaking throughout. From Teimang up the pass to Aburi it is well traced, and on the whole in good order. The portion through the village of Aburi is in very bad order and in great want of repair.

The village of Aburi is larger than I had expected. It is full of goats and sheep, and is like a coast, not like a bush, village, in that it is constructed without any attempt at arrangement, although there are three streets in it.

Mr. Kemp's house, which I passed and visited on my way up, is admirably situated on a fairly level open space, looking from the brow of the hill over the great plain towards Pram Pram. It seems to be well constructed and simply arranged. Walls built of stone, good stone-built go-downs outside. Two very large rooms, I presume a school-room downstairs and a dormitory upstairs. Found very pleasant quarters at Government House, Aburi.

29th instant.—In the morning went round the grounds with Mr. Crowther. They are very well kept and clean. Besides English vegetables and the flower garden there are—

i. a considerable area of Liberian coffee;
ii. a small area of Arabian coffee;
iii. a litttle cacao of about a year old under plantain trees for shade;
iv. a considerable area, some acres, of quite young cacao under the same shade;
v. some considerable extent under native products such as sweet potatos and cassava; and
vi. a number of scattered fruit trees, a little india-rubber, some annatto, &c.

By far the largest area is the Liberian coffee, and it is a very healthy and promising cultivation. It is in several patches of different ages, from a year to nearly three years old. It all looks well, and the older trees are bearing crop. It is planted 12 × 12.

The Arabian coffee is planted 8 × 8. and has been allowed to grow up to 6 feet high. I think this is a mistake. All cultivated Arabian coffee previously seen by me has been topped at about the height of a man's waist, and I believe that it is understood to be the best height. It looks healthy, and is bearing crop, not much of which is, however, now left to gather.

The crop which is gathered is successfully cleaned by the most primitive method I have ever seen. It is scraped with a round stone in the hollow of a larger stone by hand, and then washed and dried in the sun. It is obvious that it would be impossible to deal with any considerable amount in this way, but there is not much Arabian coffee, and so it is made to answer. When, however, the Liberian coffee comes to be plucked, the crop is due in about three months, it will be necessary to adopt some kind of machinery, and as there is no water power here, and as it is not desired to provide expensive machinery, I spoke to Mr. Crowther about a hand pulper. He showed me a book of advertisements of coffee machinery, and proposed to buy a hand coffee pulper for Liberian coffee at the cost of 47*l*. In conversation we subsequently agreed that a smaller one, costing, I think, 27*l*., would be large enough. When brought out it ought to be housed; it will require, of course, only a small building, and this should be placed on the side of the great tank furthest from the house, in order that the required small stream of water may run down to it and not have to be carried by hand. A cement-washing tank for the coffee of small size should lie below the machine, and beyond or to the side of that a small cemented barbecue or drying ground.

I think this purchase should be at once sanctioned and the machine got out if possible in time for the coming crop. The construction of the shed and barbecue must await its arrival, as we cannot tell its exact size. Even though the present area of Liberian coffee is not nearly in full bearing, it is obviously impossible to deal with the crop of 10 acres with a couple of stones. I have accordingly asked Mr. Crowther to prepare a requisition for the pulper so that it may be forwarded at once, and a vote may be taken for it at the next meeting of Council.

While on the subject of coffee, I may state that the Arabian coffee so-called (it is no doubt the descendant of the Jamaica coffee imported by the Basel Mission) is the smallest I have ever seen. This is probably because the elevation is too low for it, being more suitable to the Liberian variety. It is perhaps also attributable to no attention having been spent on the selection of seed, and the original importation having been 40 years ago. The largest berries should always be selected for seed. Mr. Crowther is trying a variety of coffee from Sierra Leone, which he tells me grows very well at sea-level there, and fetches a good price. I think it would be well to get fresh seed of the Arabian variety from Jamaica.

Again I thought, as I did on Mr. Batty's plantation near Jukwa when visiting it early this month, that the cacao is the most promising of the cultivations. Every tree looked extraordinarily healthy, there is, of course, but little of the bearing age and even that still very young. The plantain clumps planted for shade no doubt give a very dense, perhaps too dense, shade, but it is generally accepted that the plantain is a very exhausting crop and it is obvious that in the case of cacao, which requires rich soil, it is inexpedient to grow merely for shade an exhausting tree, the fruit of which is practically valueless. I was therefore glad to see that Mr. Crowther is engaged in propagating another shade tree, the one usually used for the purpose, with which to replace his plantains.

The other cultivations in progress are not yet of considerable importance. The rubber looks promising, and the great difficulty of dealing with rubber, that of extracting the rubber in sufficient quantities to pay for the trouble without damaging the tree, is not yet a question for solution. Mr. Crowther has a good show of oranges, some of them excellent, and several varieties including that from Canary, of bananas, but none of them, not even the last named, satisfies a person who has tasted the many excellent kinds of oranges and bananas which are common in the East. There is practically no other fruit at all.

Two or three matters I think might have attention ; in the first place, the first opportunity should be taken of an officer who can survey being in Aburi to get a plan of the garden in detail. It is highly important to know the produce per acre of the different coffees, and it will be important when it has progressed a little more to know the same of the cacao.

In the second place, something more might be done for the flower garden. Roses are very easily got out by parcel post, and the only rose tree here is very flourishing. A selection of begonias and other things suitable for a tropical hill garden, might be asked for from Kew. Many kinds of cacti would flower in Aburi profusely. Anything that would come out cheap in the form of bulbs would help to make a show.

I think too, arrangements could be made for introducing new varieties of fruit. The success, for instance, of the introduced Avocado Pear has been wonderful ; there must be many other such introductions possible ; new varieties of pine-apples, the Durian of the Straits, and some good mangoes. The African mango is one of the most loathsome of the fruits of the earth. There is plenty of space at Aburi and no object in extending any of the experimental cultivations now in hand further than to show that they can be made economically successful.

A. M. A.

The opinion expressed in the above report on shade plants for cacao may possibly be misunderstood by cultivators in West Africa. It may be mentioned that plantains and bananas are universally used as temporary shade plants for cacao. At present there is nothing better, if not too closely placed. The fruit of both is capable of being utilised ; as much, indeed, as if they were planted for the fruit alone. For permanent shade the case is different. A fairly lofty and deep-rooted tree is then necessary, such as species of *Erythrina* used in Trinidad and Central America, the Sand-box tree (*Hura crepitans*) and the Saman (*Calliandra Saman*).

In regard to the small-beaned Arabian coffee found in West Africa, this is remarkable as growing at low elevations, almost at sea-level. A small sample received at Kew from the Botanic Station at Lagos was valued in November last at 94*s*. per cwt. The most generally cultivated coffee plant for low elevations is undoubtedly the Liberian coffee.

CCCCXXXVI.—DECADES KEWENSES.

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECAS XII.

111. **Ceanothus leucodermis,** *E. L. Greene* [Rhamnaceæ]; fruticosus vel arborescens, ramis rectis crassiusculis rigidis ramulisque divaricatis brevibus spinescentibus floriferis glabris albo-glaucis, foliis paucis parvis brevissime petiolatis coriaceis ovalibus obtusiusculis serratis vel serrato-dentatis supra glabratis subtus præcipue in nervis pubescentibus, thyrsis subsessilibus numerosis elongatis angustis subcylindraceis, floribus cœruleis.

Habitat.—California: doubtless of the Coast Range, but special locality unknown. Collected many years since, by *Lobb.*

Folia 4–8 lin. longa, medio 3–5 lin. lata. *Thyrsi* 1½–2½, poll. longi, diametro ½ poll. nudi vix interrupti.

There are specimens from Douglas and Coulter referred to *C. divaricatus,* which are perhaps varieties of the species here proposed; but these are more leafy, the leaves thrice as large, more elongated in outline and with margins nearly entire; their flower-clusters shorter and thicker. All are easily distinguishable from Nuttall's *C. divaricatus* by their glabrous and white-glaucous branches and branchlets, and by their subsessile and leafless inflorescence. The true *C. divaricatus,* less divaricate than these in its branching, and therefore not well named, is still a rare shrub in the herbaria. Its branches and twigs are slender, somewhat pubescent, and entirely devoid of bloom or any kind of white indument; its flower-clusters are on distinct leafy peduncles. It really does not belong to what is known in California as the spinescent and rigidly divaricate group of the genus. On the contrary, its affinities are quite with *C. integerrimus.* It should here be explained that the specimens of Douglas to which I here refer are those from which Hooker and Arnott drew the description of *C. divaricatus* for the botany of Beechey's voyage; and from this point everybody seems to have been led as to the identity of Nuttall's species; so that at present about 19 out of 20 of the herbarium specimens extant under the name *C. divaricatus* represent this very different white-barked group, of which *C. incanus, C. cordulatus,* and *C. leucodermis* are representative. The sheet of specimens typical of *C. leucodermis* appears to be unique, and was communicated to the Kew Herbarium by Mr. Veitch.

112. **Staphylea holocarpa,** *Hemsl.* [Sapindaceæ]; frutex vel arbor parva 10–12-pedalis (*A. Henry*), glabra vel cito glabrescens, foliis longe petiolatis 3-foliolatis, foliolis subcoriaceis lateralibus subsessilibus terminali longe petiolulato omnibus oblongo-lanceolatis abrupte breviterque acuminatis basi obtusis subtus pallidioribus obscure calloso-serrulatis reticulato-venosis, venis primariis lateralibus utrinque circiter 10, floribus ignotis, capsula pyriformi atque triangulari abrupte acuminata, seminibus subellipsoideis griseis nitidis.

Habitat.—China: Nanto and mountains to the northward, province of Hupeh, *A. Henry,* 3017 and 4536.

Folia cum petiolo usque ad 6-poll. longa, petiolo communi 2–3-pollicari; foliola 2–3 poll. longa, 1–1½ poll. lata. *Pedunculi* 2–3 poll. longi. *Capsulæ* 1½–2 poll. longæ.

113. **Pyrus** (§ **Malus**) **Prattii**, *Hemsl.* [Rosaceæ]; novellis apresse albo-pilosis cito glabrescentibus, ramulis fructiferis crassiusculis, foliis longe petiolatis chartaceis ovato-lanceolatis ovatis vel interdum fere ellipticis acute acuminatis basi sæpissime rotundatis interdum obliquis minute creberrimeque subduplicato-calloso-serrulatis citissime glabrescentibus, venis primariis lateralibus utrinque circiter 10, venis ultimis minute reticulatis, floribus mediocribus subcorymbosis, corymbis multifloris terminalibus subsessilibus, pedicellis gracilibus, calycis lobis crassis præcipue intus albo-sericeis acuminatis, petalis brevissime unguiculatis subcordiformibus apice late rotundatis conspicue venosis, filamentis deorsum leviter incrassatis parcissime puberulis, stylis 5 glabris, fructu parvo ovoideo punctato segmentis calycinis intus lanatis coronato.

Habitat.—China: chiefly near Tachienlu, at 9000–13,500, province of Szechuen, *A. E. Pratt*, 93 and 824.

Folia absque petiolo 3–4 poll. longa; petioli $\frac{3}{4}$–1 poll. longi. *Pedicelli* circiter pollicares. *Calycis lobi* sesquilineares. *Petala* 4 lin. longa. *Fructus* 5–6 lin. longus.

114. **Ophiocaulon Rowlandi**, *Baker* [Cucurbitaceæ]; sarmentosus, glaber, cirrhis elongatis simplicibus, petiolo apice glandula magna unica prædito, foliis simplicibus membranaceis cordato-orbicularibus leviter palmato-lobatis, cymis multifloris ad cirrhorum reductorum latera productis, calycis tubo brevi campanulato lobis oblongis maculis copiosis atro-brunneis decoratis, petalis calyci æquilongis, antheris linearibus magnis, filamentis brevissimis.

Habitat.—Interior of Western Lagos, near Abbeokuta, *Dr. Rowland.*

Folia $1\frac{1}{2}$–2 poll. longa et lata. *Pedicelli* 5–6 lin. longi. *Flores* masculi 3–4 lin. longi.; fœminei ignoti.

Nearly allied to the widely spread Tropical African *O. cissampeloides*, Hook. fil.

115. **Othonna disticha**, *N. E. Brown* [Compositæ-Senecionideæ]; caulibus vel ramis simplicibus apice racemoso- vel corymboso-floriferis glabris anguste bialatis dense foliatis, foliis distichis erectis vel suberectis imbricatis ellipticis vel elliptico-oblongis obtusissimis sessilibus basi in alas cuneatim decurrentibus glabris subcarnosis?, pedunculis fere usque ad involucrum foliiferis monocephalis, capitulo discoideo 20–30-floro floribus centralibus sterilibus, involucri tubuloso-campanulati bracteis quinque uniseriatis basi liberis sed marginibus intertextis oblongis acutis vel obtusis apiculatis versus apicem leviter carinatis alternis late membranaceo-marginatis ciliatis, corolla 5–dentata tubo gracili fauce ampliata glabra alba, stylis in omnibus floribus bifidis, achæniis fertilibus subteretibus validis dense tomentosis, pappi setis copiosis.

Habitat.—South Africa: Transvaal, near Lydemburg, *Atherstone*; Makwongwa Mountains, near Barberton, 4500 feet, April, *Galpin*, 902; no locality, *Mrs. Saunders* (*Wood*, 3915).

Folia $1\frac{1}{2}$–3 poll. longa, 1–$1\frac{1}{2}$ poll. lata. *Pedunculi* $\frac{1}{2}$–$1\frac{3}{4}$ poll. longi. *Capitulum* $\frac{1}{2}$–$\frac{3}{4}$ poll. diam. *Involucri* bracteæ $\frac{1}{2}$–$\frac{3}{4}$ poll. longæ, 2–4 lin. latæ. *Corolla* 7 lin. longa. *Achænia* $\frac{1}{3}$ poll. longa, $\frac{1}{8}$ poll. crassa.

A very distinct species, remarkable for the strictly distichous arrangement of the leaves, and the zigzag wing formed by their decurrent bases on opposite sides of the stem. The flowers are stated by

Mr. Galpin to be creamy-white. The affinity of *O. disticha* is with the species of a shrubby habit, more especially with *O. coriifolia*, Sond., and those plants which have been generically separated from *Othonna* under the names of *Lopholæna* and *Othonnopsis*. A careful examination leads us to the conclusion that *Othonnopsis* should be reduced to *Othonna*.

116. **Lactuca nana,** *Baker* [Compositæ-Cichoriaceæ]; perennis, radice crassa fusiformi, foliis radicalibus evanescentibus, caulibus brevissimis glabris dense cæspitosis, bracteis parvis ovatis, capitulis dense corymbosis, involucro oblongo bracteis interioribus 8 linearibus dorso glabris exterioribus ovatc-lanceolatis, achenio castaneo indistincte rostrato, pappo albo molli copioso.

Habitat.—Interior of Western Lagos, *Dr. Rowland.* Namuli Makua country, East Tropical Africa, *J. T. Last.*

Caulis 2-3-pollicaris. *Involucrum* semipollicare. *Achænia* 2 lin. longa. *Pappus* 4 lin. longus.

This curious, dwarf, densely-tufted species belongs to the section *Brachyrhampus*, and is allied to *L. goræensis*, Schultz-Bip.

117. **Episcia (Centrosolenia) densa,** *Wright* [Gesneraceæ-Cyrtandreæ]; herba robusta, caule brevi purpureo minute pubescenti, foliis oblongis acuminatis basi rotundatis vel subacutis supra leviter pilosis subtus glabris purpureis, marginibus serrulatis, petiolis laminis dimidio brevioribus purpureis supra planis subtus convexis, floribus pluribus in axillis foliorum congestis, calyce segmentis 5 postico libero reliquis conjunctis extus purpureis intus viridibus, corolla cylindrica basi contracta et in calcarem brevem producta extus dilute lutea intus purpureo suffusa, staminibus 4 prope basin corollæ insertis, antherarum apicibus cohærentibus, disco glandula postica magna cæteris omnino deficientibus, ovario supero subgloboso apice piloso, stylo filiformi, stigmate capitato.

Habitat.—British Guiana: River Masouria, *Jenman*, 2414.

Petiolus 4 poll. longus, *lamina* 8 poll. longa, 4 poll. lata. *Calyx* 10 lin. longus. *Corolla* 1½ poll. longa.

Allied to *Episcia erythropus*, Hook. fil., Bot. Mag. t. 6219, but differing in the corolla having shorter lobes and a longer spur. This plant has been in cultivation at Kew.

118. **Calathea cyclophora,** *Baker* [Scitamineæ-Maranteæ]; acaulis, foliis longe petiolatis oblongis cuspidatis glabris utrinque pallide viridibus concoloribus basi rotundatis, pedunculo brevi radicali, floribus geminis niveis in spicam oblongam aggregatis, bracteis arcte imbricatis glabris orbicularibus chartaceis pallide brunneis apice cuspidatis squarrosis, corollæ tubo elongato cernuo lobis lineari-oblongis, staminodiis obovatis corollæ lobis æquilongis.

Habitat.—British Guiana: Essequibo, *Appun*, 252. Flowered at Kew Oct. 1894; received from the Demerara Botanic Garden in 1890.

Foliorum lamina 8–10 poll. longa, 4–4½ poll. lata; petiolus laminæ æquilongus. *Scapus* 2–4-pollicaris. *Spica* 1½–2-pollicaris, bracteis 9–12-lin. longis. *Corollæ* tubus 12–15 lin. longus; lobi 4–5 lin. longi.

Allied to *C. æmula*, Körnicke (*Fl. Bras.* iii. pars. 3, t. 21), and the well-known *C. zebrina*, Lindl., but the flower is white and the leaves not at all variegated, so that it is not a striking species from a horticultural point of view.

119. **Calathea Gardneri,** *Baker* [Scitamineæ]; acaulis, scapo radicali elongato gracili glabro, foliis longe petiolatis oblongis acutis chartaceis glabris basi cuneatis, floribus in spicam densam oblongam aggregatis, bracteis glabris chartaceis arcte imbricatis inferioribus orbicularibus obtusis fertilibus superioribus sterilibus oblongis acutis, flore "cæruleo," corollæ tubo bracteæ fertili æquilongo, staminodiis exterioribus parvis obovatis corollæ lobis æquilongis.

Habitat.—Brazil: province of Ceara, in woods near Crato, *Gardner*, 2031.

Scapus 8-12-pollicaris. *Lamina* 6–10 poll. longa, medio 2½–3 poll. lata. *Spica* 1½–2 poll. longa, bracteis floriferis 8–9 lin., superioribus vacuis 12–14 lin. longis. *Staminodia* exteriora 3–4 lin. longa.

This belongs to the small section *Comosæ*, in which the spike is crowned by a coma of sterile bracts, which are different from the fertile ones in shape and texture. It is very near to the plant figured as *C. capitata* by Peterssen in "Flora Brasiliensis," vol. iii. part 3, page 120, tab. 33, but I do not think this is identical with the Peruvian *C. cupitata*, Lindl.

120. **Aglaonema angustifolia,** *N. E. Brown* [Aroideæ]; caule erecto nitidissimo, foliis petiolatis petiolis longe vaginatis basi abrupte dilatatis laminis elongato-lineari-oblongis acuminatis basi cuneato-rotundatis marginibus undulatis costa utrinque prominenti nervis utrinque 4–6 supra impressis viridibus immaculatis, pedunculo quam petiolus breviore terminali pallide virenti, spatha parva ellipsoidea apiculata antice aperta albida, spadice breviter stipitato e spatha brevissime exserto cylindrico obtuso, ovariis subseriatis luteolis, stigmate magno centro depresso, antheris albis.

Habitat.—Straits Settlements: Pangkore, *Curtis*, *Scortechini*.

Caulis 3–3½ lin. crassus. *Foliorum* petioli 1¼–2 poll. longi, laminæ 5–9½ poll. longæ, ½–1 poll. latæ. *Pedunculus* ½–2¼ poll. longus. *Spatha* 1–1½ poll. longa, 5–7 lin. diam. *Spadix* (stipes 2–3 lin. longus inclusus), 10 lin. 1½ poll. longus.

A very distinct species easily recognised by its long narrow leaves. The upper part of the stem is of a silvery grey, very smooth, and shining as if polished when alive. The above description was made from a living plant sent to Kew by Mr. C. Curtis, Assistant Superintendent, Garden and Forest Department, Penang.

CCCCXXXVII.—MISCELLANEOUS NOTES.

Visitors during the year 1894.—The number of persons who visited the Royal Gardens during the year 1894 was 1,377,588. This shows a falling off as compared with 1893 of, in round numbers, 450,000, which is probably to be attributed to the marked difference in the summer of the two years. The total does not, however, differ appreciably from that for 1891, and does not depart very widely from 1,416,887, the average for the preceding ten-year period.

The actual annual attendance of visitors at Kew now oscillates about a figure which probably nearly approaches a million and a half. And at this it is perhaps likely to remain for some time with the existing means of access from London.

The detailed numbers for 1894 are given below :—

Month.	Numbers.	Month.	Numbers.
January	18,184	Brought forward	785,009
February	32,992	July	185,427
March	218,514	August	211,192
April	139,741	September	101,550
May	229,161	October	42,228
June	146,417	November	31,738
		December	20,444
Carried forward	785,009	Total	1,377,588

Curtis's Botanical Magazine.—This illustrated work, which has reached the 107th year of its existence and its one hundred and twentieth volume, is, and long has been, a permanent record of a selection of the most ornamental and useful plants flowering at Kew during the year. Fifty out of 60 of the figures published in last year's volume were drawn from plants that flowered at Kew.

Hooker's "Icones Plantarum."—The second part of the fourth volume of the current series of this publication contains figures of a number of new tropical African *Apocynaceæ*; a new "Jaborandi," *Pilocarpus microphyllus*; *Stenomeris borneensis*, the third species of this somewhat anomalous genus; *Euphorbia Abbottii*, a distinct species from Aldabra Island, in the Indian Ocean; *Rhynchocalyx*, a new genus of *Lythrarieæ*, and various other interesting plants.

Arenga Engleri, *Becc.*—This palm, described by Signor Beccari in *Malesia*, iii. p. 184, was discovered by the late Mr. R. Oldham in Formosa (Nos. 626 and 627) where it has since been collected by Mr. C. Ford, F.L.S. (No. 26) and Dr. A. Henry (Nos. 798 and 798A.). According to Dr. A. Henry it grows in shady spots and reaches a height of about 5 feet. The fronds bear numerous pinnæ, the longest of which are about 16 in. long and 1 in. broad, and much constricted at the base and irregularly toothed at the apex. The axis of the frond is semiterete near the base and triangular at the apex, and more or less covered with brownish furfuraceous scales. The much-branched spadices are borne amongst the leaves and are about a foot long. The fruit is subglobose, about 8 lines in diameter and 3-celled, bearing in each cell a single seed, convex on the dorsal side, with an obtuse angle on the ventral side and having on its spermoderm numerous reticulations; the minute embryo is situated in the centre of the dorsal side. Mr. C. Ford, who has introduced the plant into the Hong Kong Botanic Gardens, and has recently sent seeds to Kew, states that the flowers have a most delightful perfume, which fills the air for a very great distance around it, the whole country about Keelung being scented with it in the month of June.

Botany of the Pilcomayo Expedition.—After considerable delay, an account has appeared (*Transactions and Proceedings of the Botanical Society of Edinburgh*, xx. 1894, pp. 44–78) of the plants collected by Mr. J. Graham Kerr, naturalist to the unfortunate Argentine Expedition of 1890–91, to the Rio Pilcomayo, in the Grand Chaco of South America. The collection was presented to Kew (*Kew Bulletin*, 1891, p. 276), and Mr. Graham Kerr has supplemented the enumeration and descriptions supplied to him by notes on the localities, uses, native names, and other particulars. Taken altogether it is a valuable contribution to our knowledge of an interesting flora.

Scientific Reports of Mr. Conway's Karakoram Expedition.—These, together with maps on a large scale showing the route, have been issued in a separate volume. The botany consists of a systematic list of the plants, with the localities and altitudes at which they were collected. As already reported (*Kew Bulletin*, 1893, p. 145) the collection of dried plants was presented by Mr. Conway to Kew. Only two were previously undescribed; but the list is valuable, first as giving a good idea of the flora of a glacial region, and secondly for the careful manner in which the plants have been localised.

Koorders' Malayan Plants.—Mr. S. H. Koorders, associated with Dr. Th. Valeton, has lately published an important contribution to our knowledge of the trees of Java, based on extensive investigations and collections made on the spot. The main part of the work is in the Dutch language, but it also contains Latin descriptions of all the species. It is issued under the Latin title of *Additamenta ad Cognitionem Floræ Javanicæ*. Pars 1. Arbores. A good many new species are described, and through the kindness of Dr. M. Treub, Director of the Buitenzorg Botanic Garden, Kew has received a set of Koorders' plants, including authentically named specimens of many of these novelties.

Fiji.—A collection of plants from Fiji has been received from Mr. D. Yeoward, Curator of the Botanical Station there. Besides native plants, the collection includes many specimens of introduced plants. A species of *Vavæa* has proved to be new, and a description of it has been drawn up for the *Bulletin*. It forms a large tree, with leaves nearly a foot long and clusters of numerous white flowers. One plant, called by the natives *Lutu Lutu ni Vicau*, is an apparently undescribed species of *Macaranga*, remarkable for its very obliquely peltate lanceolate leaves nearly 2 feet long.

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 98.] FEBRUARY. [1895.

CCCCXXXVIII.—COFFEE CULTIVATION AT THE GOLD COAST.

Coffee cultivation in West Africa is gradually extending. In the lowlands the plant chiefly cultivated is *Coffea liberica*; but a small-berried form of *Coffea arabica* is also grown. The beans of this are very small, but the produce when well cleaned has been valued as high as 94*s*. per cwt. For the hills of the interior the best plant is undoubtedly the robust *C. arabica* grown in the Blue Mountains of Jamaica. This has large heavy beans, often fetching from the best estates 140*s*. per cwt. There is no danger of introducing disease with this coffee.

Several private coffee plantations have been started at the Gold Coast (*Kew Bulletin*, 1892, p. 300). Those at Aburi at the Botanic Station have also been noticed (*Kew Bulletin*, 1895, p. 11). The following correspondence communicated to Kew by the Secretary of State for the Colonies affords information of a coffee and cacao plantation of a moderately large size in course of being established near Cape Coast Castle:—

COLONIAL OFFICE to ROYAL GARDENS, KEW.

Colonial Office, Downing Street,
February 2, 1895.

SIR,

I AM directed by the Secretary of State for the Colonies to transmit to you, for your information, the accompanying extract from a despatch from the Governor of the Gold Coast Colony, with an account of Messrs. Miller Brothers and Company's coffee plantation at Kuby Kul, near Cape Coast.

I am, &c.
(Signed) R. H. MEADE.

The Director,
Royal Gardens, Kew.

(Enclosure.)

EXTRACT from Despatch from the Governor of the Gold Coast, No. 14 of the 8th January 1895.

An interesting account is given by Mr. Holmes of Messrs. Miller Brothers and Company's coffee plantation at Kuby Kul, which is about 10 miles inland from Cape Coast. About 150 acres have been cleared and planted with coffee and cacao, and the first yield was obtained in 1893. The actual cost of the plantation has been 2,400*l.*, and with this modest expenditure the plantation will undoubtedly prove a very profitable undertaking. I enclose an extract of the portion of Mr. Holmes's report which refers to the plantation, in case your Lordship should wish to send it to the Director of the Royal Gardens at Kew.

(Extract.)

District Commissioner's Office,
Cape Coast, October 13, 1894.

* * * *

I have visited Messrs. Miller Brother and Company's plantation at Kuby Kul twice during the quarter by the kind permission of their courteous agent, Mr. Batty. The estate consists of a commodious house and drying sheds and about 450 acres. It is situated about 10 miles inland. The Cape Coast Sefwhi main road (which is now being constructed by the Government) skirts the west side and the old Amin road to Denkera the other. The highest elevation is about 150 feet above the sea level. I first visited the plantation in 1892, when there were only about 20 acres planted with cacao and Liberian coffee ; the other part was covered with thick bush and forest. The plantation is only four years old, the first planting from the nursery being in June 1890. The estate has been increased year by year in areas of about 50 acres at a time, and the rearing of plants and planting out, &c. has proceeded as under :—

Year.	No. of Cacao Plants reared.	No. of Coffee Plants reared.	Number planted.	Yield of Cacao.	Yield of Coffee.
1890 -	500	3,000	Planted out.	—	—
1891 -	1,500	3,000	,,	—	—
1892 -	2,000	15,000	,,	—	—
1893 -	2,500	3,000	,,	2½ cwt.	18 cwt.
1894 -	1,500	1,500	,,	Crop in progress of picking and curing.	
	8,000	25,500	25,500	—	—
In nursery	1,500	15,000	—	—	—
	9,500	40,500	—	—	—

The coffee trees are planted out 13 feet square apart, but I think it has been found from experience that 10 feet would be ample. There are about 30 acres now cleared which remain to be planted. The valleys have been utilized for the cacao and the elevated portions for coffee. At present there are roughly 150 acres fully planted with trees which are of the following respective ages, viz. :—

20 acres coffee, 4 years old.
2½ ,, cacao, 4 ,,
(One acre of these trees were brought from Aburi Botanical Gardens.)
60 acres coffee, 3 years old.
20 ,, cacao, 2 ,,
25 ,, coffee, 2 ,,
15 ,, cacao, 1½ ,,
10 ,, ,, has been planted this year.

The first crop from the older trees was picked in 1893. This year about one-half the plantation is in bearing. The cacao shows signs of bearing in its third year from seedling, and the coffee two years from time of planting out from the nursery. Before the whole of the 150 acres will begin to yield a return three years must yet elapse.

The cost of clearing forest, planting out, and weeding for the first four years is on an average of about 4*l.* per annum per acre. That is to say, an estate of 150 acres in the fourth year would represent 2,400*l.* capital spent on cultivation. This includes the cost of management and all expenses of labour, but not cost of plants or first cost of the land; after the fourth year it is reckoned that the cost will fall to 3*l.*, and in the seventh year to 2*l.* This is accounted for by the growth of the trees giving sufficient shade to cover the whole of the ground, thus causing less weeding. It is now calculated that one man can keep 3 acres clean, and the cost of that labour is about 9*l.* per head per annum. The weeds are well kept down throughout the estate, and the surface of the ground kept regularly tilled by Krooboy and native labour with the use of a hoe. Under such careful management insects or fungoid disease, &c. do not appear to cause any trouble, and in the month of September the trees were a perfect picture of health and vigour, the young trees being in full bloom. Mr. Batty everywhere acts according to the maxim that what is worth doing is worth doing well.

Cacao-curing.—The beans are fermented for three days, then placed on shelves in the drying house for two days. After that they are exposed to the sun direct for two or three weeks until thoroughly dry.

Coffee-curing.—At present the dry process is adopted, but when the yield increases the usual wet process will be used. The berries are now placed on the drying ground first, as they are picked from the trees and allowed to remain there for a period of six weeks, and when dry they are pounded in mortars by hand till the husks and parchment come off.

(Signed) J. R. Holmes,
District Commissioner.

CCCCXXXIX.—DECADES KEWENSES.

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS XIII.

This decade consists of descriptions of new plants collected by Mr. Maurice S. Evans, of Natal, during a trip made in July 1894 to the Drakensberg, for the purpose of exploring some caves formerly occupied by the Bushmen. The part of the Drakensberg Range where they were collected lies between Cathkin Peak and Giants Castle, at an elevation of 6,000 to 9,000 feet above the sea, among the sources of the Bushman's River. This region is about the highest part of the Drakensberg, and has scarcely been visited by a collector before, hence it was only to be expected that the collection should contain several novelties. Practically very little of the Drakensberg has been explored botanically, and none of it thoroughly, but from the collections made by various botanists whilst crossing the Range at various points, it is evident that it contains a very rich and varied Flora, and those plants here described are mostly very distinct in character from any others yet known to science in the different genera to which they belong. Perhaps the most interesting among them is the *Gymnopentzia*, which adds a second species to the genus and brings that genus within the Natal Flora. The *Nestlera* and *Athrixia* are also remarkably distinct and interesting plants. The *Gerbera* is one of the smaller species of the genus, and its flowers have very much the appearance of the common Daisy. The *Sebæa* is remarkable for its creeping stems and perennial habit, and is well worthy of introduction into cultivation. It is to be hoped that Mr. Evans will, on future occasions, bring to light many more of the interesting plants that are doubtless hidden away in the nooks of the Drakensberg.

121. **Hermannia malvæfolia,** *N. E. Brown* [Sterculiaceæ]; ramis elongatis decumbentibus vel procumbentibus pilis stellatis asperatis, foliis petiolatis orbicularibus basi cordatis crenatis stellato-tomentosis viridibus, stipulis ovatis acutis, floribus solitariis foliis oppositis, pedicellis medio bracteatis, bractea amplectante apice bifida stellato-tomentosa, calyce campanulato fere ad medium acute quinquefido stellato-tomentoso et glanduloso, petalis obovatis obtusis basi cymbiformibus luteis extus basi stellato-pubescentibus, staminibus inclusis, filamentis planis supra medium bituberculatis tuberculis pilosis, antheris acuminatis bifidis marginibus ciliatis, ovario stellato-tomentoso, stylo elongato glabro.

Habitat.—Natal: on the Drakensberg, Bushman's River, 6,000–7,000 ft. alt., growing among dry grass, July, *Evans*, 55.

Caules 1–2 ped. longi, ½–1 lin. crassi. *Foliorum* petioli 2–7 lin. longi, laminæ 3–11 lin. diam. *Pedicelli* 2–3½ lin. longi. *Bracteæ* 1 lin. longæ. *Calycis* tubus 1½ lin. longus, lobi 1¼ lin. longi. *Petala* 4 lin. longa, 1½ lin. lata.

This is quite unlike any other species in the genus; the leaves resemble those of *Malva rotundifolia*, L., but are smaller, and not at all lobed.

122. **Helichrysum album,** *N. E. Brown* [Compositæ]; foliis radicalibus dense rosulatis obovatis vel rotundato-obovatis obtusis caulinis erectis elliptico-oblongis obtusis subamplexicaulibus concavis floccoso-lanatis, pedunculo gracili scapiformi monocephalo paucifolioso floccoso-lanato, capitulo magno multifloro, involucri bracteis lanceolatis acutis niveis basi rubro-purpureis nitidis bracteis radiantibus quam discus subtriplo longioribus, receptaculo fimbriato-foveolato obscure denticulato, corolla 5-dentata glabra, pappi setis deciduis apice clavato-barbatis, achæniis turgidis glabris.

Habitat.—Natal: on the Drakensberg at Bushman's River Pass, near the snow line, 7,000–8,000 ft., *Evans*, 48.

Folia radicalia ½–1½ poll. longa, 4–8 lin. lata, caulina 5–7 lin. longa, 2–3 lin. lata. *Pedunculi* 2–4 poll. longi. *Capitula* 1–1¼ poll. diam. *Involucri* bracteæ 4–6 lin. longæ, 1–1½ lin. latæ. *Corolla* 1½ lin. longa. *Achænia* ⅔ lin. longa.

A dwarf species, possibly of tufted habit, allied to *H. adenocarpum*, DC., and *H. marginatum*, DC. From the one-headed forms of the former it differs by its more slender, scape-like peduncles, obovate obtuse leaves, which are more densely rosulate, and the glabrous achenes. From the latter by its much broader obovate leaves and very different indumentum.

123. **Helichrysum confertum**, *N. E. Brown*; suffruticulosa caulibus ramosissimis, ramis brevibus confertis dense albo-lanatis, foliis dense confertis parvis elliptico- vel oblongo-spathulatis obtusis breviter et late petiolatis canaliculatis dense albo-lanatis, capitulis plerumque 3–5 (raro 1–2) ad apices ramorum sessilibus circa 30-floris, involucri campanulati glabri bracteis adpressis exterioribus gradatim minoribus elliptico-oblongis obtusis pallide brunneis interioribus oblongis obtusis albis opacis quam discus duplo longioribus subradiantibus, receptaculo parvo fimbrillato-denticulato, corollæ 5-dentatæ dentibus extus papillato-barbatis, pappi setis apice incrassatis scabris, ovariis papillatis.

Habitat.—Natal: on the Drakensberg, near Bushman's River, 6,000–7,000 ft., *Evans*, 49.

Folia cum petiolo 2½–4½ lin. longa, 2–3 lin. lata. *Capitula* 4–5 lin. diam. *Involucri* bracteæ exteriores 1–2 lin. longæ, ¾–1 lin. latæ, interiores 3–4 lin. longæ, ¾–1¼ lin. latæ. *Corolla* 1½ lin. longa.

A very distinct species, unlike any other in the genus, the nearest approach to it being *H. Youngii*, Hook. fil., an alpine New Zealand species. It appears to be a dwarf species of compact habit, with woody stems ⅛–⅙ in. thick, having short, densely crowded branchlets at their ends, densely clothed with white woolly leaves. Mr. Evans states that it grows "in shrubby clumps."

124. **Nestlera virgata**, *N. E. Brown* [Compositæ]; caulibus erectis gracilibus simplicibus vel apice brevissime ramosis hispidulis brunneis, foliis alternis fasciculatis linearibus subcanaliculatis acutis mucronulatis hispidis, capitulis sessilibus terminalibus solitariis vel pluribus in ramulis brevibus lateralibus versus apicem caulium racemosis multifloris, involucri campanulati bracteis linearibus acuminatis scariosis brunneis glabris exterioribus gradatim minoribus, receptaculo epaleaceo foveolato, floribus radii 18–22 uniseriatis involucro longioribus lineari-oblongis obtusis tridenticulatis supra luteis subtus fusco-purpureis inferne glandulosis, floribus disci tubulosis 5-dentatis glandulosis luteis, antheris basi longe caudatis, pappi squamis brevibus in cupulam dentatam plus minusve connatis, ovariis radii adpresse pubescentibus, disci glabris.

Habitat.—Natal: on the Drakensberg, 6000–7000 ft. alt., July, *Evans*, 50.

Caules 7–16 poll. alti. *Folia* 2–5 lin. longa, ⅓–1 lin. lata. *Capitula* 7–8 lin. diam. *Involucri* bracteæ interiores 5 lin. longæ, ½–¾ lin. latæ. *Corollæ* radii 4½–5 lin. longæ, 1 lin. latæ, disci 2¾ lin. longa. *Pappus* ¼ lin. longus.

A well marked plant, quite unlike any other in the genus, and somewhat resembling a *Relhania* in general appearance, but the receptacle is without paleæ.

125. **Athrixia pinifolia,** *N. E. Brown* [Compositæ]; fruticosa, ramis teretibus erectis inferne basibus foliorum delapsorum plus minusve vestitis, foliis confertis sessilibus adscendentibus subrigidis linearibus acutis dorso convexis marginibus scabrido-ciliatis glabris, pedunculo monocephalo prope apicem ramorum solitario quam folia plerumque longiore dense scabro-pubescente, capitulo circa 100-floro, involucri campanulati bracteis multiseriatis sublaxis lanceolatis vel subspathulato-lanceolatis acutis apice plus minusve recurvis scariosis brunneis basi viridibus glabris exterioribus gradatim minoribus, receptaculo plano nudo, floribus radii lineari-oblongis apice minute tridentatis involucrum excedentibus albis subtus purpureo-vittatis, floribus disci tubulosis superne ampliatis breviter 5-dentatis luteis glabris, pappi setis uniseriatis asperis, ovariis pubescentibus.

Habitat.—Natal: on the Drakensberg, in the bed of the Bushman's River, among boulders, July, *Evans*, 59.

Frutex 2–3 ped. altus. *Folia* 1–1½ poll. longa, ½–1 lin. lata. *Pedunculi* 9–18 lin. longi. *Capitula* 9 lin. diam. *Involucri* bracteæ interiores 4 lin. longæ, ½ lin. latæ. *Corollæ* radii 4 lin. longæ, disci 2 lin. longæ.

A very distinct species, with the habit of certain species of *Relhania* and *Nestlera acerosa*, Haw.

126. **Printzia laxa,** *N. E. Brown* [Compositæ]; ramis gracilibus apice albo-tomentosis, foliis alternis petiolatis ellipticis vel elliptico-ovatis acutis mucronulatis basi cuneato-acutis marginibus mucronulato-dentatis supra viridibus sparsissime arachnoideis subtus albido-tomentosis, capitulis magnis solitariis terminalibus radiatis multifloris, involucri campanulati bracteis 5–6-seriatis exterioribus gradatim minoribus lanceolatis acutis apice pubescentibus ciliatis fuscisque, floribus radii lineari-ligulatis apice tridentatis roseis vel roseo-purpureis, floribus disci tubulosis 5-dentatis, luteis, ovariis pubescentibus.

Habitat.—Natal: on the Drakensberg, Bushman's River, 6,000–7,000 feet alt., July, *Evans*, 53.

Foliorum petioli 2–4 lin. longi, laminæ 1–3 poll. longæ, 9 lin.-1½ poll. latæ *Capitula* 12–14 lin. diam. *Involucrum* 5 lin. longum. *Corollæ* radii 7 lin. longæ disci 3½ lin. longæ.

In habit and foliage this somewhat resembles *P. Huttoni*, but the involucre is very different.

127. **Gymnopentzia pilifera,** *N. E. Brown* [Compositæ]; fruticosa, ramis subtetragonis erectis decussato-ramosis, ramulis brevibus cum foliis albopilosis demum glabris, foliis oppositis basi vaginato-connatis ad medium vel infra bilobis, lobis integris vel furcatis subteretibus subobtusis, capitulis parvis ad apicem ramorum dense corymbosis discoideis 40–70-floris breviter pedicellatis, involucri hemisphærici bracteis triseriatis adpressis lanceolatis acutis vel subacuminatis fusco-marginatis ciliatis, receptaculo convexo nudo, floribus involucrum excedentibus exterioribus tantum fertilibus, corollæ tubo cylindrico apice abrupte ampliato quinquefido extus glanduloso-papilloso luteo, achæniis teretibus 10-costulatis puberulis.

Habitat.—Natal: on the Drakensberg, near Bushman's River, 6,000–7,000 ft. alt., July, *Evans*, 51.

Ramuli foliiferi et floriferi 9 lin.-1 poll. longi. *Folia* 5–7 lin. longa, lobi ¼ lin. lati. *Pedicelli* 1–3 lin. longi. *Capitula* 2½–3½ lin. diam. *Involucri* bracteæ 1 lin. longæ. *Corolla* 1¼ lin. longa. *Achænia* ⅔ lin. longa.

This differs from *G. bifurcata*, Benth., by its much shorter and racemosely decussate flowering branchlets, the lobes of the leaves being frequently forked, the long white silky hairs which laxly clothe the young shoots and leaves, the much shorter pedicels, more acute bracts of the involucre, and the corolla has a longer and more slender tube, and is much more abruptly dilated in the upper part than it is in *G. bifurcata*.

128. **Gerbera parva,** *N. E. Brown* [Compositæ]; foliis parvis radicalibus longipetiolatis late ovatis obtusis apiculatis basi cordatis marginibus dentatis supra glabris viridibus subtus albotomentosis, scapis quam folia duplo longioribus gracilibus monocephalis nudis vel apice bracteolatis et versus apicem tomentosis, bracteis parvis lanceolato-subulatis glabris, capitulis parvis radiatis, involucri bracteis lineari-lanceolatis acuminatis exterioribus gradatim minoribus subglabris viridibus vel atropurpureo suffusis, floribus radii 18–22 uniseriatis involucrum subduplo excedentibus, labio antico ligulato apice tridentato albo subtus plus minusve purpureo suffuso, postico lobis duobis minutis dentiformibus composito, floribus disci subbilabiatis lobis quinque subæqualibus, pappi setis scabridis albidis, ovario glanduloso.

Habitat.—Natal: on the Drakensberg, near Bushman's River, in a damp place, 6,000–7,000 ft. alt., July, *Evans*, 57.

Foliorum petioli ¾–1¾ poll. longi, laminæ 4–8 lin. longæ, 3–6 lin. latæ. *Scapi* 3½–4½ poll. longi. *Bracteæ* 1–2 lin. longæ. *Capitula* 8 lin. diam. *Involucri* bracteæ interiores 4 lin. longæ. *Corollæ* radii 4 lin. longæ, disci 2½ lin. longæ.

A well marked species, with flower heads closely resembling those of *Bellis perennis* in size and appearance. Mr. Evans only found it in one place.

129. **Sebæa Evansii,** *N. E. Brown* [Gentianeæ]; caulibus tenuibus repentibus radicantibus ramosis cæspitoso-intertextis glabris, foliis parvis petiolatis ovatis vel subreniformibus obtusis vel subapiculatis basi cuneatis subcarnosis glabris, floribus terminalibus solitariis vel binis pedicellatis vel subsessilibus, calycis profunde quinquifidi lobis lanceolato-oblongis acutis dorso carinatis glabris, corolla calycem duplo excedenti 5-loba lutea lobis tubo angusto longioribus spathulato-obovatis obtusis, staminibus 5 fauci corollæ tubi insertis filamentis edentatis antheris linearibus sagittatis apice glanduliferis multo brevioribus, stylo elongato supra basin bituberculato, stigmate integro.

Habitat.—Natal: on the Drakensberg, Bushman's River, in damp places on flat rocks, 6,000–7,000 ft. alt., July, *Evans* 56; Ingeli Mountain in moist places, 6000 ft. alt., July, *Tyson*, 1378; without locality, *Cooper*, 2761.

Foliorum petioli ½–1½ lin. longi, laminæ 1–2 lin. longæ, 1–2½ lin. latæ. *Pedicelli* ¼–3 lin. longi. *Calyx* 1¾ to 2½ lin. longus. *Corollæ* tubus 2–3 lin. longus, lobi 2–4½ lin. longi, 1¼–2 lin. lati. *Staminum* filamenta ⅓–⅔ lin. longa, antheræ 1–1⅓ lin. longæ. *Stylus* 2⅓–3 lin. longus.

Very distinct from all the other species of the genus by its creeping stems, which are apparently perennial; they root at the nodes and become interwoven into dense masses, bearing hundreds of flowers together, according to a note on Mr. Evans's label.

130. **Nemesia albiflora,** *N. E. Brown* [Scrophularineæ]; **herbacea erecta viscoso-pilosa, foliis ovatis subobtusis dentatis basi rotundatis in petiolum abrupte cuneatim decurrentibus supremis sessilibus, floribus axillaribus solitariis, pedicellis tenuibus, sepalis linearibus vel lineari-oblongis acutis, corollæ labiis æqualibus superiore profunde 4-fido segmentis oblongis obtusis, inferiore integro obovato obtusissimo palato bicalloso glanduloso-pubescenti calcare lineari labiis breviore, capsula compressa oblonga apice triangulari-emarginata, seminibus late alatis oblongis utrinque emarginatis minute tuberculatis.**

Habitat.—Natal: on the Drakensberg, Bushman's River, growing in old caves, 6,000–7,000 ft. alt., July, *Evans*, 58; without locality, *Gerrard*, 1,230.

Planta 4–18 poll. alta. *Foliorum* petioli 2–6 lin. longi, laminæ ½–2¼ poll. longæ, 4 lin.–1½ poll. latæ. *Pedicelli* 6–8 lin. longi. *Sepala* 1½–2 lin. longa, ⅓–½ lin. lata. *Corollæ* labia 3–4 lin. longa, calcar 2 lin. longum. *Capsula* 3–4½ lin. longa, 2½–3 lin. lata. *Semina* 1 lin. longa, ¾ lin. lata.

Allied to *N. pubescens*, Benth., but the flowers are larger, white with a few violet veins (not yellow as in *N. pubescens*), and the capsule larger and much more deeply emarginate. Possibly a plant collected by Cooper (no. 623) in the district of Albany, Cape Colony, should be referred here, but it is more glabrous, and the palate of the corolla appears to be yellow. I describe from Mr. Evans's specimens.

CCCCXL.—AGRICULTURAL FARMS IN THE BOMBAY PRESIDENCY.

The annual report of the Department of Land Records and Agriculture, Bombay Presidency, for 1892–93, contains an account of the Bhadgaon Experimental Farm, which has lately been sold by Government in favour of a new one which it is proposed to establish in the neighbourhood of Surat.

The advantageous sale of the farm is alone a measure of its success. But the summary of its work for the past ten years by Mr. E. C. Ozanne, the Director of the department, affords striking evidence of the valuable instruction which may be obtained by the Government from such an institution, and of the direct benefits which it confers on local agriculture. To ascertain the limits within which that agriculture is susceptible of improvement is even more important than to prosecute experiments the ultimate success of which may be beyond the area of what is practically possible.

Amongst other things accomplished at the farm is the value of the use of bisulphide of carbon for weevil attack in stored grain. This subject was first brought into notice by Kew in 1879, and the correspondence on the subject is reproduced in the *Kew Bulletin*, 1890, p. 144.

Bhadgaon Farm.

This farm has just been sold for a satisfactory sum. It measured 1,156 acres. Of that area 812 acres were originally transferred from Government waste for the use of the farm, and have been principally used as grass and hay land. The remainder was purchased from time to time from private occupants, often at a high price, for in this area not only was the land already cleared for cultivation, but there were several wells which added to its value. It may be said that the sale price was equivalent to 25 times the assessment on the former area, and to 40 times on the latter. Such a price is a proof, not merely of the increased value of land, but of the improvement made in it during its utilisation as a Government farm. Live and dead stock fetched more than the last valuation made, and the standing crops, which under a favourable season were unusually fine, nearly as large a figure as the gross value of the crop of the previous year, though the purchaser bears the cost of harvest, and the risk of untimely rain and the like. As to buildings, the total expenditure on new erection, renovation, and repairs during the last 10 years came to Rs. 12,800. The farm buildings, together with the bungalow, which originally (1883) cost Rs. 5,000, sold for over Rs. 11,000, a fair price. The whole farm was purchased by a capitalist, who intends to work it as a farm, though he may sub-let portions from time to time.

The reason why the farm was sold is, broadly speaking, its isolated inaccessible situation, but among other reasons were the failure of the Jámda Canal, the unhealthiness of the locality, and the great dearth of labour.

The sale proceeds are in part available for the acquisition of land for another farm in a more suitable locality, and for the erection of farm buildings, and for stocking. In all probability the new farm will be located in the neighbourhood of Surat.

As to the working of the farm in the year under report, I need only say that the kharif season was unfavourable; but the late crops were, partly on this account, good enough to show a profit, on the whole, of Rs. 6 per acre of cropped land, or nearly as large a profit as that shown on the average of the previous five years.

The experiments made were chiefly those which have been carried on for a series of years. They may best be described in the following general remarks, which, I think, show what use the farm has served during the last decade.

It has taught us fully the local systems of cultivation, has in some respects shown that that system is improvable, and has given facts of agricultural value which could not have been otherwise obtained. We have demonstrated the benefit of selection of seed, a point to which local cultivators were and are inattentive, but to which more attention has been attracted, and it is not presumptuous to say that this is a lesson taught which will not be wholly forgotten.

We have proved that it is useless to innovate in implements, though we have found a place for improved sugar-cane mills, for improved bullock hoes, and, within limitations, for the utilisation of English ploughs. We have introduced from abroad, as well as from other parts of India, and successfully grown some new varieties of staple crops, *e.g.*, the giant variety of bájri from Gujarát, cotton from Broach and elsewhere, new kinds of jowári, several varieties of wheat from various places, among which the Muzáffarnagar soft white has done very well, and potatoes, the future of which is hopeful.

We have thoroughly studied the merits and demerits of local and other cottons. It has been proved that American long-stapled varieties, though not successful if sown at once as received from America, will succeed well if first acclimatised in Dhárwár, and that such cottons are very useful on light land. We have demonstrated the unwisdom of attempting to oust the local Varádi variety, but have helped the cultivators by placing at their disposal indigenous seed of this variety, improved by selection on the farm, which they have freely purchased. We have kept alive the Jari and Bani kinds of the Berárs. We have proved that the Government interference which was once recommended to restrict the growth of indigenous inferior staples, is injudicious, because the climatic conditions suit the short-stapled varieties best.

Our continued trial of different wheats have shown that soft white wheat, with irrigation, not only succeeds well, but yields better than local hard varieties, and that though at first some deficiency of crop must be suffered, the soft kinds will hold their own, without risk of loss of consistency and colour. The trials have been sufficiently satisfactory to warrant a distribution of soft white seed among cultivators in the Tápti valley. If soft white seed finds a better market than hard, it is certain that it will be grown, and this may also be affirmed with regard to the long-stapled cottons.

We have saved the cultivator much by testing various exotics, often highly recommended, on the farm before allowing the rayat to run the risk of experiments doomed to failure. This was notably the case in respect to pedigree wheats from England and Australia.

Our stock-rearing has been the least successful venture, and has cost us more than any other class of trials; but we have shown that the Mysore breed, though very useful and lasting to a considerable age, cannot be stall-reared with profit. The strain has its merits, and will leave its stamp in the neighbourhood. We find that it is difficult to improve on the local breeds of sheep and goats. The Dumba of Sind soon deteriorates.

In the difficult question of crop diseases and insect attack we have proved the value of several specifics, in particular the sulphate of copper and carbolic acid pickles for smut, and bi-sulphide of carbon for weevil attack in stored grain.

We have demonstrated the unsoundness of the former encouragements given towards the growth of road-side trees in the midst of cultivation as a means of enlarging the area of tree-growth, and shown the direction in which such encouragement is safe.

We have learnt much regarding the effect of manures on black soil. The deduction drawn is a confirmation of a widespread belief as to the inexhaustible character of deep black lands, and that on such land manure to a rabi crop does not pay either when the season is favourable or when it is unfavourable, the factors of rainfall or irrigation proving the more potent. We have demonstrated clearly the immense value, in India, of systematic green manuring, particularly with papilionaceous leguminous crops.

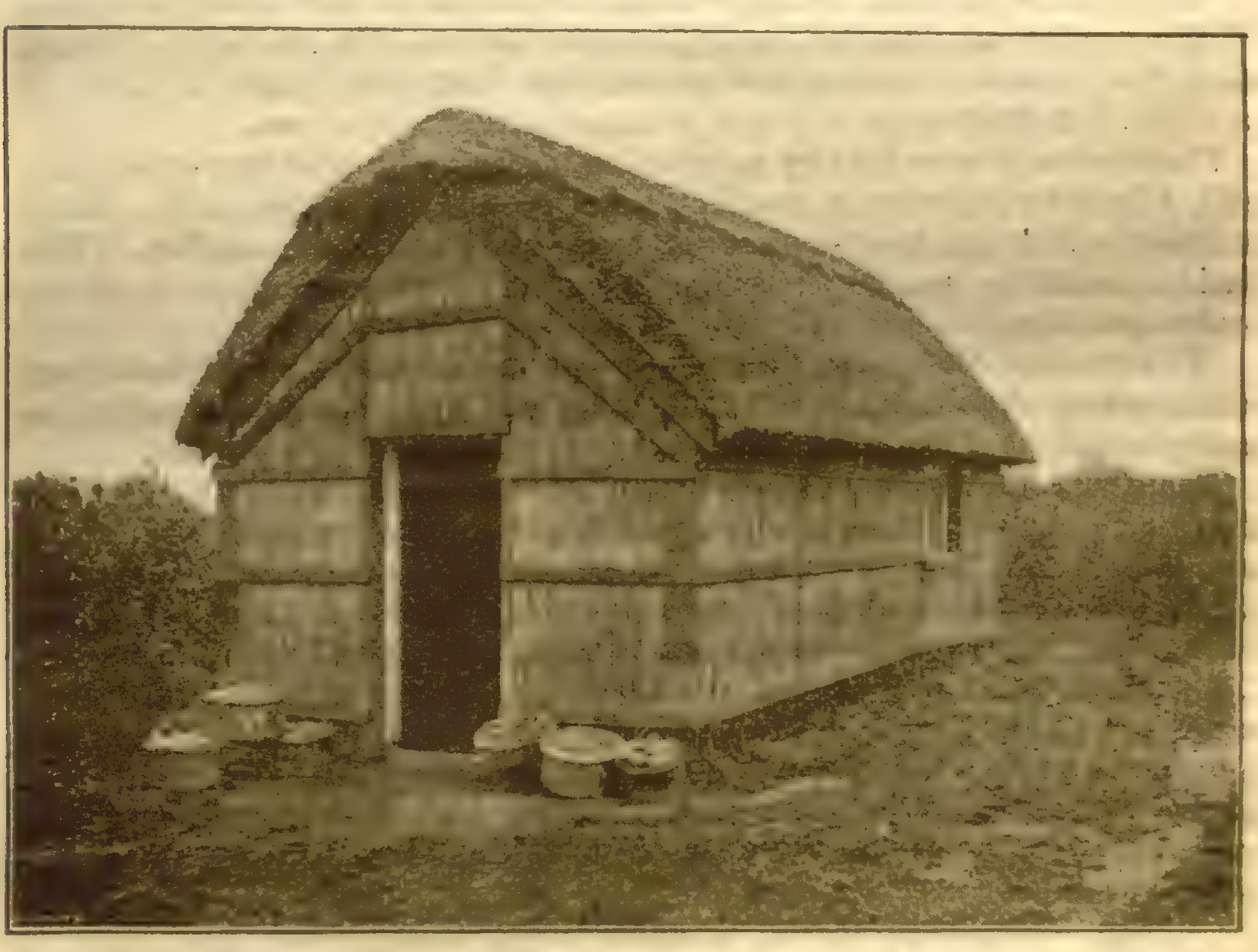
Lastly, the farm has largely increased our knowledge as to the adaptability of foreign systems and special practices, such as ensilage and haymaking, and has given us several well-trained native agricultural experts who will be utilised in the future under more favourable conditions.

CCCCXLI.—STORING HOME-GROWN FRUIT.

A cheap and effective means for storing home-grown apples and pears would greatly increase the value and usefulness of these fruits. The elaborate and costly fruit-rooms attached to large country houses are beyond the reach of persons of moderate means or of small market growers. A simple and practical means of storing fruit would enable it to be brought to market over longer periods, and to some extent obviate the annual and wasteful glut which discourages the grower by reducing the price without giving much benefit to the consumer.

In the *Journal of the Royal Horticultural Society* (vol. xviii., pp. 145–148), a description by Mr. George Bunyard of a fruit room devised by him is published with an illustration. It is 30 feet long by 12 feet wide, is capable of holding 300 kinds of fruits, and costs about 30*l*.

Mr. Bunyard has been good enough to communicate some further particulars of this fruit room to Kew. In view of its simple construction and general usefulness, it is desirable that its merits should be more widely known. The following account is therefore reproduced. The illustration has been lent by the Council of the Royal Horticultural Society :—



PARTICULARS OF FRUIT ROOM.

Foundation.—First level the soil and dig out holes for the corners large enough to admit brick piers 14 by 14 inches, or stones about 1 foot square; fix an iron dowel in the centre to receive the corner posts of the structure. Some provision for air, such as air bricks, or an aperture covered outside and inside with perforated zinc, should be provided just above the ground line. If over 20 feet long an extra foundation should be put in at the half distance.

Main Posts.—Make these 6 feet long, 6 inches square, and prepare a hole in the foot to receive the dowel mentioned above; this will keep the framework firm. The main ground plate should be 4½ by 3, and the top plate of the same size; support and steady these in the usual way with quartering 4½ by 3, and when fixed, choose a dry day to pitch, tar, or cold creosote the lower plates and all the woodwork 2 feet from the ground to protect from damp. The quartering should show an even outside face.

Outside Covering.—The cheapest material will be ¾-in. matchboard, and it may as well be fixed on the rafters as well. Pitchboard 4½ by 1; rafters 3 by 2.

Bonds from one side to the other should be 4½ by 3; if stout they are useful to hold planks, on which baskets can be placed overhead in the roof. To receive the vertical thatch a side board is attached 6 inches wide from the ground to roof, in which the thatch is placed upright, and it is kept in position by lateral splints of wood 3 by 1, shown in engraving.

The thatch may be 18 inches thick on the roof and 6 inches at the sides, and where it can be procured, carex or reed is strongest and most lasting, but it may be of wheat-straw or heather. The eaves should project a good way to protect from damp.

Doors.—An inside and outside door should be provided. They must be made to fit closely to exclude draughts.

Windows.—In order to allow of an inspection of the fruit, windows of 21 oz. glass are inserted, and this saves the use of a candle at storing time, but outside shutters are provided to keep the place as dark as possible. A fruit room is perhaps better without windows.

Ventilation is provided by an opening under the apex of the roof at each end, 1 inch by 9 inches, a small opening being left between the dairy shutters which can be stopped by hay or moss in severe weather. The inside should be protected by perforated zinc, fine enough to keep out wasps and flies.

Thieves and Rats.—In order to protect the contents, a half-inch stout wire netting should be fastened to the matchboard outside so that an entry would be difficult. This is advisable also to keep out rats.

Inside Shelves on which to lay the fruit are readily fixed at the sides; first place uprights 2 inches by 1½ inches from the ground to the roof, and then attach bearers 2 by ¾ on this to the quartering. We find 1 foot between the shelves a very convenient distance. This places the lowest shelf 6 inches from the ground, making six in all up to the eaves. The shelves are made of ¾-in. matchboard, and need not quite meet each other so as to allow a slight circulation of air. Upon these we place lengths of clean wheat straw, so that the fruit shall not quite touch the shelves. In the centre of the fruit room we have a narrow table with a raised edge, made of three lengths wide of matchboard, set on trestles; this is useful for special sorts.

Names.—Get a slip of zinc 4 inches long, turn up one end 1 inch, at an angle of 45, and then slit this angle three times and bend it so that it will hold a neat card; the other end can be slipped under the straw.

The fruit must never be wet when stored, and should be handled very carefully and laid singly on the shelves, but in the case of small apples (russets, &c.) they will keep well three or four thick. Carefully overlook from time to time and remove rotten or spotted fruit, and keep the floor always damp.

These few hints will enable growers to keep late pears to March, and apples to May or June.

CCCCXLII.—NEW ORCHIDS: DECADE 13.

121. **Pleurothallis parva,** *Rolfe;* cæspitosa, caulibus secundariis gracilibus teretibus, foliis crassissimis carnosis linearibus obtusis canaliculatis basi convolutis, racemis brevibus circa 4-floris, bracteis triangulari-ovatis acutis basi tubulosis, sepalo postico oblongo acuto carinato, lateralibus fere ad apicem connatis lineari-oblongis acutis carinatis, petalis obovato-oblongis subobtusis uninerviis, labello trilobo lobis lateralibus parvis falcato-oblongis acutis intermedio oblongo obtuso apice crenulato, columna clavata.

HAB.—Brazil.

Caules $\frac{3}{4}$–1 poll. longi. *Folia* 8–11 lin. longa, $1\frac{1}{2}$–$1\frac{3}{4}$ lin. lata. *Racemi* 6 lin. longi. *Bracteæ* $\frac{3}{4}$ lin. longæ. *Pedicelli* $\frac{3}{4}$ lin. longi. *Sepala* $2\frac{1}{2}$ lin. longa. *Petala* 1 lin. longa. *Labellum* 1 lin. longum. *Columna* $\frac{3}{4}$ lin. longa.

A small species which was found by Messrs. F. Sander & Co. in a clump of *Cattleya harrisoniana*, Batem., having flowered in their establishment in January of the present year. It belongs to Lindley's section *Brachystachyæ*, and is allied to *P. klotzschiana*, Rchb. f., while in size and general habit it is comparable to *P. sonderana*, Rchb. f. The flowers are wholly deep yellow. No description can be found which agrees with it, and so small a plant might easily be overlooked, especially in this large genus, even in a region so comparatively well known.

122. **Dendrobium robustum,** *Rolfe;* pseudobulbis erectis elongatis medio paullo incrassatis robustis, foliis oblongis oblique obtusis coriaceis, racemis subterminalibus elongatis multifloris, bracteis oblongo-lanceolatis acutis, sepalis lineari-oblongis subobtusis obscure undulatis apice recurvis, mento conico obtuso, petalis lineari-spathulatis obtusis semitortilibus obscure undulatis, labello trilobo lobis lateralibus semioblongis obtusis intermedio oblongo obtuso crispo-undulato, disco subcarnoso quinquecarinato, carinis antice in lamellas 3 elevatas undulatas evolutis, columna brevi.

HAB.—New Guinea.

Pseudobulbi 2–$2\frac{1}{2}$ ped. alti. *Folia* 5–6 poll. longa, $1\frac{1}{2}$ poll. lata. *Bracteæ* 2–$2\frac{1}{2}$ lin. longæ. *Pedicelli* 8–10 lin. longi. *Sepala* 8–9 lin. longa. *Petala* 10 lin. longa. *Labellum* 9 lin. longum, 4 lin. latum. *Mentum* 4 lin. longum. *Columna* 2 lin. longa.

This species was introduced by Messrs. F. Sander & Co., and flowered in their establishment in January last. It is allied to *D. mirbelianum*, Gaudich., which, however, has longer acute sepals and petals, and much larger bracts. Descriptions of two or three additions to this group have recently appeared, though none of them fit the present plant, which is consequently considered to be new. The flowers are yellowish green, with several light purple lines on the base of the sepals, a broader purple band on the lower half of the petals, and numerous radiating purple lines on the lip, which become slightly reticulated on the front lobe. It is a robust growing plant.

123. **Dendrobium velutinum,** *Rolfe;* pseudobulbis aggregatis fusiformi-elongatis demum sulcatis brevibus apice paucifoliatis, foliis lanceolato- v. elliptico-oblongis apice obliquis subobtusis, racemis

axillaribus bi-trifloris, bracteis brevissimis v. subobsoletis, ovariis triquetris, sepalis lanceolato-oblongis acutis carinatis, mento brevi obtuso, petalis elliptico-oblongis acutis, labello unquiculato trilobo subpandurato velutino minute denticulato lobis lateralibus suborbicularibus intermedio latissime ovato, columna clavata.

Hab.—Burmah, Shan States.

Pseudobulbi 2–5 poll. longi. *Folia* 2½–2¾ poll. longa, 6–10 lin. lata. *Racemi* ¾–1 poll. longi. *Pedicelli* 1¼–1½ poll. longi. *Sepala* 1 poll. longa, 3 lin. lata. *Petala* 10 lin. longa, 4½ lin. lata. *Labellum* 10 lin. longum, 7 lin. latum. *Mentum* 1 lin. longum. *Columna* 3 lin. longa.

A very distinct species, which was introduced by Messrs. Charlesworth & Co., Heaton, Bradford, early in 1894. It is evidently allied to *D. trigonopus*, Rchb. f. *Gard. Chron.*, 1887, ii., p. 682, but differs in the absence of markings on the lip, as well as in various structural details. The flowers of *D. velutinum* are uniformly deep yellow, and the lip velutinous. They somewhat resemble those of *D. cariniferum*, Rchb. f., except in wanting the long spur-like mentum which characterises the section *Formosæ*. On the other hand, the strongly three-lobed lip and general aspect of the flower are very different from any of the yellow flowered species of section *Eudendrobium*, so that the exact affinity of these two species, as Reichenbach indicated for the original one, is still doubtful.

124. **Cirrhopetalum gracillimum**, *Rolfe;* rhizomate repenti, pseudobulbis tetragono-ovoideis monophyllis subdistantibus, foliis oblongis obtusis basi attenuatis, scapis elongatis gracilibus 6–9 floris, floribus umbellatis, bracteis lineari-lanceolatis acuminatis, sepalo postico ovato-oblongo longe caudato ciliato, lateralibus angustis prope basin connatis longissime caudatis, petalis triangulari-lanceolatis caudatis ciliatis labello recurvo carnoso lateraliter compresso, columna brevissima dentibus brevibus obtusis.

Hab.—Burmah?

Pseudobulbi 8–9 lin. longi. *Folia* 2½ poll. longa, 6–7 lin. lata. *Scapi* 6–7 poll. longi. *Bracteæ* ¾–1 lin. longæ. *Pedicelli* 2–2½ lin. longi. *Sepalum* posticum 3 lin. longum; lateralia circiter sesquipollicaria. *Petala* 2½ lin. longa. *Labellum* ¾ lin. longum. *Columna* ½ lin. longa.

A very distant species originally sent by T. R. Jarvis, Esq., Laurel Grove, Chelmsford, and afterwards by Mr. J. O'Brien, and Messrs. F. Horsman & Co. It belongs to the group with a ciliate dorsal sepal, but has no near ally among Indian species. The flowers are reddish purple, thus resembling *C. Cumingii*, Lindl., in colour, while in shape they are best compared with *C. vaginatum*, Lindl., both of which are very different in other respects. There is a doubt about the habitat; one record being "India," the other "Burmah?"

125. **Cirrhopetalum mysorense**, *Rolfe;* rhizomate valido, pseudobulbis tetragono-ovoideis monophyllis distantibus, foliis lineari-oblongis obtusis basi attenuatis, scapis gracilibus 4–5-floris, floribus umbellatis, bracteis ovato-oblongis subacutis, pedicellis gracilibus, sepalo postico ovato-lanceolato subobtuso, lateralibus falcato-linearibus subobtusis, petalis elliptico-oblongis obtusis trinerviis, labello oblongo recurvo medio canaliculato carnoso lævi, columna brevissima dentibus brevibus obtusis.

Hab.—S. India, hills of Mysore.

Pseudobulbi ¾–1 poll. longi. *Folia* 3½ poll. longa, 7–8 lin. lata. *Scapi* 3–4 poll. longi. *Bracteæ* 1½–2 lin. longæ. *Pedicelli* 3½–4 lin. longi. *Sepalum* posticum 4–5 lin. longum, 1¾ lin. longum; lateralia 6–7 lin. longa. *Petala* 2½ lin. longa, 1½ lin. lata. *Labellum* 1½ lin. longum. *Columna* 1 lin. longa.

This species was introduced by Mr. James O'Brien, with whom it first flowered in September 1891, and afterwards in the collection of Sir Trevor Lawrence, Bart. It is allied to the Himalayan *C. maculosum*, Lindl., though different in numerous particulars, both of structure and colour. The flowers are nearly white, with the exception of the lip, which is purple.

126. **Cirrhopetalum nodosum**, *Rolfe;* rhizomate valido nodis paullo incrassatis, pseudobulbis oblongis v. anguste ovato-oblongis monophyllis, foliis lineari-oblongis obtusis basi attenuatis, scapis brevibus 6–7 floris, floribus subracemosis, bracteis lanceolatis acutis, sepalo postico ovato-oblongo acuto minutissime denticulato concavo, lateralibus connatis attenuatis subacutis, petalis ovatis subacutis margine erosis, labello recurvo lineari-oblongo subobtuso, columna brevissima dentibus brevibus acutis.

HAB.—South India, Nilghiri hills.

Pseudobulbi 1¾–2 poll. longi, 1–2¼ poll. distantes. *Folia* 5½ poll. longa, 8 lin. lata. *Scapi* 3½ poll. longi. *Bracteæ* 2–2½ lin. longæ. *Pedicelli* 4–4½ lin. longi. *Sepalum* posticum 4 lin. longum; lateralia 12–14 lin. longa. *Petala* 1½ lin. longa. *Labellum* 1¼ lin. longum. *Columna* 1 lin. longa.

A species first received from Mr. J. O'Brien in August 1892. It is allied to *C. Macræi*, Lindl., having the umbels slightly racemose, as in that species, though the flowers are more nearly like those of *C. cornutum*, Lindl. The habit is peculiar. The rhizomes are stout and woody, and the pseudobulbs some distance apart; the intervals showing several somewhat thickened nodes, in allusion to which the name is given. The flowers are densely speckled with reddish brown on a somewhat lighter ground.

127. **Cirrhopetalum setiferum**, *Rolfe;* rhizomate valido, pseudobulbis oblongis v. ovoideo-oblongis monophyllis, foliis anguste oblongis obtusis basi attenuatis, scapis gracilibus 4–6 floris, floribus umbellatis, bracteis lineari-lanceolatis acuminatis, sepalo postico ovato-oblongo concavo apice setifero eciliato, lateralibus caudato-attenuatis, petalis falcato-oblongis apice subito contractis setiferis eciliatis, labello recurvo subcarnoso lateraliter subcompresso, columna brevissima dentibus lineari-spathulatis apice obliquis acutis.

HAB.—Himalaya.

Pseudobulbi 1 poll. longi, 1–2 poll. distantes. *Folia* 9–10 poll. longa, 1½ poll. lata. *Scapi* 9–10 poll. longi. *Bracteæ* 2½–3 lin. longæ. *Pedicelli* 6–7 lin. longi. *Sepalum* posticum 5–6 lin. longum; lateralia 1½–1¾ poll. longa. *Petala* 3½ lin. longa. *Labellum* 2 lin. longum. *Columna* 1 lin. longa; dentes 1 lin. longi.

This species was sent by Mr. James O'Brien in August 1891, and a year later by Sir Trevor Lawrence. The former received it in a case of plants which contained *Pholidota repens*, Rolfe, and certain other novelties, together with one or two old species which indicate the habitat as somewhere in or near Sikkim, a point which has previously been doubtful. It has the habit of *C. cornutum*, Lindl., but considerably enlarged, and with the addition of long slender setæ on the tips of the petals and dorsal sepal, and very remarkable column-teeth. The setæ indicate an approach to *C. picturatum*, Lodd., the next species, though in other respects it is very different.

128. **Cœlogyne lamellata**, *Rolfe;* scapo erecto 2–3-floro, bracteis lanceolatis acutis deciduis, ovariis hexapteris, sepalis oblongo-lanceolatis acutis carinatis concavis, petalis linearibus acutis, labello trilobo lobis lateralibus semioblongis apice rotundatis intermedio ovato subacuto, disco 9-lamellato lamellis corrugato-undulatis, columna clavata aptera.

HAB.—New Hebrides.

Bracteæ $1\frac{3}{4}$ poll. longæ. *Pedicelli* 1 poll. longi. *Sepala* $1\frac{1}{2}$ poll. longa, 6–8 lin. lata. *Petala* $1\frac{1}{2}$ poll. longa, $1\frac{1}{4}$ lin. lata. *Labellum* $1\frac{1}{4}$ poll. longum, 11 lin. latum. *Columna* 10 lin. longa.

A distinct *Cœlogyne*, sent by Messrs. F. Sander & Co. in August last with the information that it was received from a gentleman whose name and address have been unfortunately mislaid. It is the second species known from the New Hebrides, the earlier one being *C. M'Donaldi*, F. Muell. and Kränzl. in *Œster. Bot. Zeitschr.*, xliv., p. 209, which is obviously allied to the present one, though the sepals are not described as keeled, the keels of the lip only five, the sepals and petals as having some dusky spots, and the lip yellowish flesh colour. The present species has the sepals, petals, and column uniformly pale whitish-green and the lip white. Almost the whole lip is corrugated. The lower half of the front lobe bears five strongly corrugated keels, which extend to the base of the lip, while along the side lobes four additional ones extend, two on either side. The next two pairs of nerves on either hand also bear a number of tubercle-like swellings.

129. **Maxillaria mooreana**, *Rolfe;* pseudobulbis oblongis monophyllis, foliis lanceolato-oblongis acutis, pedunculis brevibus vaginis laxis acutis subimbricatis, bracteis spathaceis oblongo-lanceolatis acutis, sepalo postico elliptico-oblongo acuto subcarinato subconcavo, lateralibus triangulo-ovatis subobtusis, mento conico obtuso, petalis elliptico-lanceolatis acutis, labello integro elliptico-oblongo obtuso disco dense farinaceo, callo late oblongo obtuso, columna clavata.

HAB.—Guatemala.

Pseudobulbi $1\frac{1}{2}$ poll. longi. *Folia* 8–10 poll. longa, 11–20 lin. lata. *Pedunculi* 4 poll. longi. *Bracteæ* 1 poll. longæ. *Sepalum* posticum 11 lin. longum, $5\frac{1}{2}$ lin. latum; lateralia $6\frac{1}{2}$ lin. lata. *Petala* 9 lin. longa, 4 lin. lata. *Labellum* 6 lin. longum, 3 lin. latum. *Mentum* 6 lin. longum. *Columna* 5 lin. longa.

A pretty species belonging to the same group as *M. grandiflora*, and approaching *M. Hübschii*, Rchb., f., which has larger flowers, with differently coloured petals and a lip fully twice as broad. It was introduced by Messrs. F. Sander & Co., and flowered in their establishment in April 1891, when it was named, though the description has not been previously published. It has since been received from Glasnevin. The flowers are cream-coloured, with seven maroon-purple stripes on each petal, except at the apex, and a densely farinaceous lip, narrowly margined with the same colour.

130. **Angræcum Smithii,** *Rolfe;* aphyllum, radicibus fasciculatis gracilibus subteretibus subflexuosis pallide viridibus, caule brevissimo, racemis gracilibus brevibus 8–12-floris, bracteis lanceolato-oblongis acutis parvis, sepalis petalisque lineari-lanceolatis acutis suberectis, labello lineari-lanceolato acuto suberecto, calcare recurvo-patenti conico, columna brevissima, pollinarii stipite simplice.

Hab.—Mt. Kilimanjaro.

Radices 4–6 lin. longæ. *Racemi* 1 poll. longi. *Bracteæ* ½ lin. longæ. *Pedicelli* ¾ lin. longi. *Sepala* et *petala* 1 lin. longa. *Labellum* 1 lin. longum; calcar vix 1 lin. longum.

A minute leafless species sent to Kew by Consul C. S. Smith, of the Kilimanjaro Delimitation Commission. It flowered early in 1894, and again during the present year. It was found growing on the same branch with *Angræcum bilobum*, var. *Kirkii*. It is like a miniature edition of *A. guyonianum*, Rchb., f., but differs in having roots only half as thick, racemes several times shorter, and distinctly smaller flowers. As the latter species has recently been referred to *Mystacidium* it seems advisable to point out that, like the present one, it has only a single stipes to the pollinarium, and certainly does not belong to that genus. It has also been transferred to *Gussonia*, which, however, has only the leafless habit to stand upon, and even that is fallacious, for leaves are sometimes developed, though they die away early. It has seven published synonyms (*Mystacidium globulosum* and *M. radicosum*, Durand & Schinz, are not only synonymous but originally based on the same number), and as at least half of them have arisen through pure misconception it seems desirable to append these remarks, otherwise the present species might also be transferred to *Mystacidium*.

CCCCXLIII.—IBOGA ROOT.

(*Tabernanthe Iboga*, Baill.)

With plate.

The roots of the plant known as Iboga in the Gaboon and Bocca on the Congo, possess tonic properties, and in large doses are said to stimulate the nervous system. Up to quite recently the only information respecting it was contained in the *Catalogue des Produits des Colonies Françaises*, at the Paris Exhibition, 1867, p. 108. Specimens were exhibited with the following note by M. Griffon du Bellay: "Gabon, *Tabernæmontana* (Sp. ?). Iboga des gabonnais. Les racines toniques, à haute dose, sont un excitant du système nerveux." A note based on this is also to be found in Moloney's *Forestry of West Africa*, p. 384.

Latterly some specimens of the roots and twigs were communicated to Kew by Dr. Hugo Müller, F.R.S. who stated "the roots called Bocca are used and much valued on the lower Congo as a febrifuge."

The plant according to Baillon, who first identified it, is known at Cape Lopez as Iboga, but it has other local names. It is the Aboua of the Pahounis and Obouété of the Gaboon.

Recently a figure and description were published in *Hooker's Icones Plantarum* [4th Series], tab. 2337. It belongs to the natural order

Apocynaceæ, *Tabernanthe Iboga*, Baill. (in *Bull. Soc. Linn.* Paris, i. 782); was collected by Mann in the Gaboon (No. 943), and by Welwitsch in Angola (No. 5950). Professor Oliver who drew up the description in the *Icones* adds "first discriminated by Dr. Baillon, but its position left doubtful though its points of contact with *Tabernæmontana* and other groups of *Apocynaceæ*, were clearly indicated by him. Were it not for the complete consolidation of the carpels one would hardly hesitate to merge it in *Tabernæmontana* itself. . . . . It is described as having a large bitter root, eaten by the Gaboon people. 'Ils la disent enivrante, aphrodisiaque, et avec elle ils prétendent qu'on n'éprove aucun besoin de sommeil.' Dr. Baillon in his *Hist. de Plantes*, x. 170, says the Oboueté of the Gaboon is a 'plante médicamenteuse des plus remarquables.'"

This is substantially all that is known of the plant at present. Further material is kindly being sought for by Dr. Hugo Müller. When this arrives it may be possible to investigate the medicinal properties of the plant more fully.

Reference to Plate.

Tabernanthe Iboga, Baill.

Fig. 1. Bud. 2. Calyx segment and gland. 3. Corolla-tube laid open. 4. Anther. 5. Pistil. 6. Transverse section of ovary near base. 7. Same near middle. *All enlarged.*

CCCCXLIV.--SIAM PLANTS.

Mr. F. H. Smiles, a gentleman attached to the Royal Survey Department of Siam, has presented a small collection of dried plants made by himself in the mountains of the interior of the northern part of that country. The specimens are not all that could be desired, this being Mr. Smiles's first essay in collecting and drying plants, undertaken without any previous instruction; but they include several interesting novelties sufficiently represented for description. Remarkable among other things is a new genus of *Scitamineæ* of quite an aberrant type. There is also a very distinct new species of *Argostemma* (*Rubiaceæ*), differing from those previously known in its small dimensions, exceeding slenderness, and one-flowered stems. Mr. Smiles left England again for Siam in the middle of December with the intention, if circumstances permitted, of making further botanical collections. Judging from what is known of the countries to the north, there must be a very rich flora in Upper Siam.

The new genus of *Scitamineæ* which is now described is remarkable in several particulars, but more especially in having unisexual flowers, and in the absence of a labellum and of staminodia of any kind whatsoever. The specimens consist of two slender stems, six to nine inches high, naked below, as if pulled away from a tuberous rootstock, and bearing two or three grass-like leaves and a terminal nodding inflorescence, with coloured bracts and bracteoles. The flowers are minute and cylindrical, and almost hidden by the folded distichous bracteoles, each of which bears one flower in its axil. There are about three or four dense globular spikelets about half-an-inch in diameter in each

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Tabernanthe Iboga, Baill

inflorescence, borne on slender stalks, springing from the axils of relatively large bracts. From the note accompanying the specimens, it would appear that the bracts and bracteoles are of a dark purple red, and the very small flowers yellow; but Mr. Smiles, not being a botanist, does not correctly discriminate between flowers and bracts. A figure of this interesting plant will shortly be published in *Hooker's Icones Plantarum.*

Achilus, *Hemsl.* [Scitaminearum-Zingiberearum genus novum].—*Flores* minuti, in axillis bracteolarum solitarii, unisexuales, ut videtur, vere monoici. *Flores* ♂ : *Calyx* cylindrico-tubulosus, obscure trilobatus. *Corolla* calycem dimidio superans, alte trilobata, lobis ovato-oblongis obtusis. *Staminodia* nulla. *Stamen* unicum; filamentum filiforme; antheræ exsertæ loculi paralleli, contigui, connectivo non producto inappendiculato. *Flores* ♀ : *Calyx* tubulosus, cylindricus, brevissime 3-lobatus. *Corolla* cylindrica, calycem paullo superans, etiam obscure trilobata. *Staminodia* nulla. *Stylodia* 2, filiformia. *Ovarium* 1-loculare, placentis parietalibus, ovulis numerosis; Stylus filiformis. Fructus ignotus. *Herba* nana, annua, gracilis, caulibus simplicibus. *Folia* graminoidea. *Inflorescentia* terminalis, nutans, e spicis paucis densis distantibus graciliter pedunculatis sistens et bracteis amplis coloratis ornata. *Flores* bracteolis distichis arcte complicatis etiam coloratis fere occulti, inferiores ♀ , supremus vel superiores ♂.

Achilus siamensis, *Hemsl.*; puberula caulibus 2–3 foliatis, foliis distichis longe vaginantibus, vaginis apertis ciliolatis apice transversim breviter ligulatis, lamina lineari-lanceolata acutissima atque vagina multinervia, supra vix hispidula, bracteis sessilibus ovali-oblongis crebre longitudinaliter venosis, venis prope marginem connexis, bracteolis, rotundatis latioribus quam longis, pedunculis puberulis, floribus papillosis, ovario ruguloso.

Habitat.—Siam: open places on Mount Putsum, near Nam Kawng, at about 2,000 feet, *F. H. Smiles.*

Caules 6–9 poll. alti. *Folia* absque vagina 1½–2 poll. longa. *Inflorescentia*, 1½–2 poll. longa. *Bracteæ*, 6–9 lin. longæ. *Bracteolæ* exteriores complicatæ circiter 3 lin. diametro. *Flores*, 3–4 lin. longi.

CCCCXLV.—MISCELLANEOUS NOTES.

News has been received of the death, on January 11th, of Mr. John Gray, Curator of the Botanic Station at Castries, St. Lucia. Mr Gray was about 60 years of age, and before going out to the tropics had had wide experience in English gardening. He converted an unwholesome swamp at Castries into a beautiful garden, and started the cultivation of numerous plants in the island. Latterly his health had suffered from recurring attacks of fever. The following note is taken from the *Voice of St. Lucia* for January 17th, 1895:—

"It is our painful duty to report the death of Mr. John Gray, Curator of the Botanical Station at Castries. Mr. Gray came to St. Lucia in 1886, on the recommendation of Mr. Morris, the Assistant Director of Kew Gardens, who has always taken a very keen interest in this, and, indeed, in all West Indian colonies. Mr. Gray had been for many years head gardener to Earl Brownlow. He went thence, at the instance of Colonel Talbot, to his estate, Worthy Park, Jamaica, to conduct some experimental cultivation which he was anxious to promote. There Mr. Gray acquired good experience in the cultivation of tropical industrial products. He will be specially remembered in connexion with the exhibit of perfumes extracted by him from West Indian flowers—a marked feature of the Jamaica Court at the Col.-Ind. Exhibition, 1886. Mr. Gray did good work in planning, laying-out, and tastefully planting what was a half-filled swamp when it first came into his hands, but which in three years time he transformed into a beautiful garden, which, though small, is an ornament to the town, and a much appreciated resort and breathing place for the townspeople. He introduced many varieties of plants and flowers, and the collection of roses at the station was at one time perhaps the finest in the West Indies. In the matter of economic plants he raised and distributed thousands of cacao, coffee, nutmegs, a few cola and sisal. On the whole, from one cause or another, the economic section of the station was not so apparent a success latterly as the purely horticultural."

Botanical Magazine for January.—All the subjects figured in this number were drawn from plants flowered at Kew. *Talauma Hodgsoni*, one of the handsomest magnoliaceous trees from the Himalayan region, flowered in the temperate house after twenty years' cultivation. *Acidanthera æquinoctialis* is an iridaceous plant inhabiting the Sugarloaf Mountain, Sierra Leone, corms of which were sent to Kew by Captain Donovan in 1893. *Lonicera Alberti* is a pretty honeysuckle of the *Xylosteum* section discovered in Western Turkestan by Albert von Regel. *Acacia spadicigera* is one of the few species of the genus having very large horn-like spines, which are usually inhabited by ants. It is a native of Central America. *Cyrtopodium virescens* is a Brazilian orchid of the tribe *Vandeæ*, introduced by Messrs. Sander of St. Albans.

Hand-List of Trees and Shrubs grown in Arboretum. Part I.—Polypetalæ. The purpose and scope of this publication is explained in the following extract from the Preface:—

The present is the first of a series of Hand-lists of the collections of living plants cultivated in the Royal Gardens which it is intended to issue from time to time.

It is hoped that they will be found useful in indicating to visitors interested in particular groups of plants, the species which Kew already possesses. In the hands of correspondents they will serve to show in what directions the collections may be added to. It is further hoped that they may be found of some value in establishing an approximate standard of nomenclature, which is often much confused in gardens and too frequently erroneous.

This is particularly the case with woody plants (shrubs and trees) grown in the open air. The preparation of the present list has accordingly been taken in hand; it represents the work of many years, and has only been accomplished with considerable labour.

A rough census of the species and distinct varieties of plants cultivated at Kew gives the total number as, approximately, 20,000. Of these 3,000 are hardy shrubs or trees.

The first catalogue of the plants cultivated at Kew was that of Sir John Hill, published in 1768 (second edition 1769). This was entitled *Hortus Kewensis*, and was an octavo volume of 458 pages. It has been reckoned to contain 3,389 species, of which 488 were hardy trees and shrubs.

In 1789 the elder Aiton published a more critical *Hortus Kewensis*, in which 5,535 species are enumerated.

The younger Aiton published 1810 to 1813 a second edition in five volumes, "and in 1814 a catalogue or epitome, as it is called, of the species contained in the five volumes, for the use of practical gardeners; it contains . . 314 additional species, the total number being 11,013."

This is the latest comprehensive list of plants in cultivation at Kew which has been published.

Occasionally lists of special collections have been issued since this date. Catalogues of the Ferns were issued in 1845, 1856, and 1868; of the Hardy Herbaceous plants in 1853; of Succulent plants in 1856; of *Aroideæ* in 1878; of *Bromeliaceæ* in 1879; of *Aloineæ*, *Yuccoideæ*, and Agaves in 1880; of Economic plants in 1881; of Palms in 1882; of Primulas in 1886; and of Orchids flowered at Kew, in 1891. Since 1885 lists of seeds available for distribution with other botanical establishments have been issued annually.

An Arboretum has been for more than a century a feature of the Kew establishment. Perhaps it dates its formal commencement from 1762, when "all the Duke of Argyll's trees and shrubs were removed to the Princess of Wales's garden at Kew, which now excels all others, under the direction of Lord Bute."

The old Arboretum in part still exists near the main gate on Kew Green. Many trees have perished and have been removed from age; but those that remain include some of the finest specimens of rare trees in the Gardens." (Some further particulars are given in the *Kew Bulletin* for 1891, page 316.)

The Botanical Garden, which was opened to the public in 1841, with Sir William Hooker as Director, comprised only about 11 acres; it included however, the old Arboretum. In 1844, by permission of the Queen, about 47 acres, including the ornamental piece of water in front of the Palm House, was added for the formation of a Pinetum. This was too near the smoke of suburban London, and it has lost its distinctive character. But many of the trees planted at this time are now of considerable magnitude.

The "Pleasure Grounds and Gardens at Kew" were in the occupation of the King of Hanover for sporting purposes at the time the Botanic Garden was given to the nation. The woods were filled with rough scrub for cover. In 1845 they were placed in the charge of Sir W. Hooker, with the "intention that they should be formed into a national arboretum." A plan for the purpose was prepared in 1846 by W. A. Nesfield. The main features were carried out at the time, and the general principle has been worked upon ever since. In 1850 the nursery was formed. In 1870 the new Pinetum was commenced.

The late Director, Sir Joseph Hooker (1865–1885), spared no pains to amass the most complete collection which could be formed of hardy woody plants. These were obtained from public and private correspondents and establishments at home and abroad, partly by purchase, partly by gift and exchange. They had necessarily for the most part to be planted under the names with which they were received, and these, from confusion or accident, were often erroneous.

A great difficulty arose in rectifying this, from the fact that woody plants can rarely be identified with any accuracy till they flower or fruit. The process of accurate identification in an extensive arboretum is necessarily, therefore, a very slow one.

A further difficulty arises in a public arboretum from the fact that, though the specimens were all carefully labelled with their history and a corresponding register kept, these labels are apt from time to be misplaced or lost. To remedy this a separate Herbarium was formed, in which a specimen was preserved of every species or variety planted out, with the name under which, and the source from which it was received. By reference to this Herbarium it was possible in a large number of cases to correct the nomenclature.

By this means it has also been possible to draw up the list of which the present is a first instalment. It must still be regarded as in some sense provisional and open to correction. But it has been possible to reduce an immense number of "trade" and "garden" names, and to bring the nomenclature to something like a standard.

It is only necessary to add that in the present *Hand-List* 994 species, with 640 varieties, have been enumerated and their names as far as possible verified. The number of synonyms given is 2,127.

Flora of Mount Kinibalu.—In the *Kew Bulletin* for October, 1892, p. 249, it was announced that Drs. H. A. and G. D. Haviland had presented Kew with a valuable collection of dried plants, collected by themselves on Mount Kinibalu, North Borneo. As a matter of fact, however, it should be explained, that although the two cousins travelled together, it was Dr. G. D. Haviland alone who did the botanizing. This fine collection has been worked out by Dr. O. Stapf, Assistant for India at the Herbarium, together with all previously collected plants from the same region, published and unpublished, notably those collected upwards of 40 years ago by Sir Hugh Low, and by Mr. F. W. Burbidge in 1877. The results appear as the second part of the fourth volume (Second Series, Botany) of the *Transactions of the Linnean Society*. This is one of the most important and interesting contributions to geographical botany published during the past year, especially in relation to the migrations of plants. The total number of flowering plants enumerated is 360, which Dr. Stapf estimates may be one-fourth or one-fifth of the whole phanerogamic flora of the mountain, and nearly 60 per cent. of these, so far as at present known, are endemic. The relationship with the Australasian flora are especially interesting.

Renewal of Heating Apparatus in Palm House.—The *Kew Report* for 1877 contained an account of the remodelled apparatus for heating the Palm House which was put in during that year. Up till the winter of 1893–4 this worked in a completely satisfactory way. The temperature at that period was often severe, and the heating had to be pressed. To this cause, as well as to a probable deterioration in the large iron castings used, due possibly both to alternations of temperature and to occasional vibrations from the movement of the water, may be attributed the serious "bursts" which took place on two several occasions at a very critical time. By the skill and unremitting energy of the engineering staff of the Royal Gardens, the fractured mains were patched up, and the collection suffered no appreciable damage from cold.

It had, however, become evident that the heating apparatus had reached a state which was extremely precarious. Her Majesty's Office of Works therefore included, in the estimates for 1894–5, a sum of 1,000*l*. for its partial renewal. During the summer of that year this was satisfactorily accomplished for the north wing. The ceiling of the furnace room was raised 2½ ft., and all the pipes which had hitherto either been buried in brickwork or carried under the beds, were renewed and re-arranged so as to be immediately accessible.

These operations involved clearing a large portion of the north wing. The opportunity was therefore taken to execute other necessary repairs, and to repaint the whole of the interior.

The total length of hot-water pipes in the Palm House has been estimated at 22,600 ft., or about 4⅓ miles. Notwithstanding, it has always been difficult to maintain a satisfactory temperature in the north wing during winter. This was especially the case during wind, the cold air forcing its way through the "laps" of the glass, which necessarily fit imperfectly, owing to the curved surface of the house. To counteract this, and avoid the necessity of pressing the boilers in severe weather, an additional 4 in. pipe was carried round the entire north half of the house and attached to a new auxiliary boiler.

In 1877 a hot-water pipe was carried round the gallery, "the heat from which replaces the loss by cooling in the dome, and consequently checks the drip and downward draughts, which had long proved so injurious to the plants." This had proved so satisfactory in working that it was determined last year to extend the principle, and a 2½ in. pipe was, in addition to the lower auxiliary pipe, carried round the inside of the lantern of the north end.

The general result of these improvements has been to render it possible to attain, during the present winter, a steady and sufficient temperature in a way impracticable before. The whole of the works were carried out under the direction and superintendence of the resident Assistant Clerk of the Works, Mr. J. Allen.

Green-glass in Plant-houses.—It is well known that the use of glass of a green tint has for half a century been a characteristic peculiarity of the plant-houses at Kew.

It was adopted as the result of reports made to the Office of Woods in 1845–6 by the late Mr. Robert Hunt, F.R.S. These reports are to be found in the appendix to his "Researches on Light" (2nd ed. 1854). He states (p. 379):—"It is required, according to Sir W. Hooker's letter of the 23rd of November, that a glass should be selected for the Palm House at Kew, 'so much stained as will deprive the glass of its scorching character and not affect the vegetation.' . . . Green glass, coloured with oxide of copper to a tint which may be called pea-green, will admit light and chemical power in the same proportions as white glass, but will obstruct the passage of those rays which produce the 'scorching' desired to be avoided." He further adds (p. 381): "I have selected a glass . . . . which is so slightly tinted as to present no appearance, by either reflected or transmitted light, materially different from the white sheet glass already employed for glazing at Kew. . . . This glass admits most freely the permeation of all the luminous and chemical rays, and obstructs only those heat rays which are remarkable for their peculiar scorching power." The glass which at any rate of late years has been used at Kew is certainly of a much darker tint than that prescribed by Mr. Robert Hunt, and is probably coloured with iron and not with copper. Prof. Norman Lockyer, C.B., F.R.S., has been so good as to examine the light transmitted by it. He reports :—

"Cuts off red and blue ends of spectrum pretty equally.

"Red-yellow reduced quite nine-tenths in intensity.

"Blue reduced quite nine-tenths in intensity.

"Transmits a fair proportion of orange, but most of light transmitted is yellow green."

It is probable that this is more severe than anything that was intended originally. But it is difficult, over a long period, without special precautions, to adhere to a standard. Mr. Robert Hunt (p. 383) stated that "the only difference which" his selected glass "produces upon the rays of light is that it cuts off a smaller portion of the lowest red ray, and slightly diminishes the length of the yellow ray by increasing the green."

It is well known that the effect of light of different degrees of refrangibility upon vegetation is by no means uniform, but has important peculiarities characteristic of particular parts of the spectrum. This is too technical a matter to enter upon here. But it is sufficient to say that the green glass in recent use at Kew, according to the modern accepted data of vegetable physiology, intercepted about half the effective influence of ordinary sunlight on the processes of plant life.

The general effect upon vegetation as a whole is clearly exemplified by the recent experience of Zacharewicz (*Annales Agronomiques*, Dec. 25, 1894, pp. 585–589). He cultivated strawberries under glass of different colours with the following results (p. 589) :—

Orange gave the maximum of vegetation, but at the expense of the quality, size, and earliness of the fruit.

Ordinary glass gave the finest and earliest fruits.

Violet gave the maximum production of fruit but at the expense of size, quality, and earliness.

Red, blue, and green were all injurious to the vegetative development of the plants, which became etiolated.

These results are, on the whole, in accordance with theory; it is not, however, obvious why violet should be less injurious than green.

Of late years at Kew the object aimed at in the use of green glass has been attained in great measure by the increasing haziness of the sky, due to the smoke produced by the rapid extension of London to the south-west. The extreme obscurity of the winter of 1885–6 showed that no available sunlight could possibly be spared. It became obvious that for the future the plant-houses must be so constructed as to exclude as little of the available sunlight as possible. The use of green glass was therefore abandoned in 1886 in all the houses except the fern-houses and the Palm-house.

In 1889 the experiment was made of substituting white glass for green in the east wing of No. II. (tropical fern-house). This was the result of the observation of the successful cultivation by Sir Trevor Lawrence, Bart., P.R.H.S., of ferns with full exposure to the light at Burford, near Dorking. The improvement in the growth of the plants was remarkable. In 1892 a portion of the west wing was also reglazed in the same manner, and the new temperate fern-house (No. III.) was wholly glazed with white glass. The result with the Gleichenias and other half-hardy ferns was everything that could be desired. As the result of these progressive experiments, it has now been determined to abandon the future use of green glass altogether at Kew.

There are no doubt plants which require shade and will not tolerate direct exposure to the sun. In the tropics Cacao can only be cultivated with the aid of some shade tree. Filmy ferns at Kew are at once killed by direct sunlight. But shading and altering the composition of the light are by no means the same thing.

The use of green glass at Kew involved a curious practical difficulty. It is almost impossible to obtain glass which is absolutely free from manganese. But the green glass which of late years at any rate has been employed at Kew, is almost certainly coloured with iron protoxide. Manganese is used in the manufacture, in the form of manganese dioxide. This is at once reduced to the sesquioxide; but under the influence of light the iron protoxide in the glass gradually steals oxygen from the manganese sesquioxide, reducing it to the oxide. The glass becomes colourless. The manganese oxide then begins to absorb oxygen from the air, and again reaches the state of sesquioxide, which gives the glass a pinkish tint. Every stage of the transition from green through white to pink may be observed in the glass of the Palm-house.

Glass partly decolourised in this manner probably closely approximates to that which Mr. Robert Hunt originally prescribed. Prof. Lockyer finds that a specimen examined by him "cuts off, very slightly, at red end, and generally throughout the spectrum." In a specimen in which the decolourisation had been completely effected, he found "no appreciable effect on any portion of spectrum to the eye." It had, in fact, become practically identical with ordinary white glass.

Yunnan Plants.—An old Chinese correspondent of Kew, Mr. W. Hancock, F.L.S., to whom it is indebted for several small collections of dried Chinese plants, has sent a further collection, comprising about 150 species of flowering plants and 120 ferns. The specimens are admirable, and often copious. These plants were collected in the neighbourhood of Mongtze, or "Mengtsz," as Mr. Hancock writes it. This place is situated in South-eastern Yunnan, just within the tropics; and although the plants were not collected at great elevations, 4,000 to 6,500 feet, they were all of a temperate or sub-tropical type. Like other parts of the vast province of Yunnan, this appears to be exceedingly rich in local species, and there can be no doubt from a cursory examination of the collection that it contains a considerable sprinkling of undescribed ones. There are probably at least 10 new ferns, a large number considering the wide range of ferns generally. Among flowering plants a species of *Jasminum*, allied to *J. nudiflorum*, is perhaps the most conspicuous. It has primrose-yellow flowers with broad overlapping petals of great substance, and they are from 1½ inch to 1¾ inch in diameter There is also a remarkable new species of *Brandisia*, with long terminal racemes of "rich red" flowers. A *Rhododendron* having very large solitary or geminate white flowers is probably new, and several elegant *Cyrtandreæ* are different from anything Kew previously possessed. The very large and distinct *Rosa gigantea*, Collett, is also among the plants collected. Some of the most striking novelties will be figured in an early part of *Hooker's Icones Plantarum.*

Perim Plants.—Mr. J. B. Farmer, F.L.S., Assistant Professor of Botany, Royal College of Science, South Kensington, had an opportunity of landing on this island on his return from Ceylon a few years ago, and he collected specimens of all the plants he found, a set of which he has lately given to Kew. The island is treeless, in fact, destitute of woody vegetation beyond a bushy *Statice* and *Cassia obovata.* Indeed, vegetation of any kind is exceedingly sparse, and the only plant seen in quantity was *Cleome brachycarpa.* Altogether only eleven species of flowering plants were collected, all of them known from the neighbouring mainland on one or both coasts.

Plants from Lake Tanganyika.—Mr. Alexander Carson has presented a further collection of about 100 species of plants from this interesting country. It is estimated that 30 of the species are new to science, and descriptions of them will appear in an early number of the *Kew Bulletin.* The novelties belong chiefly to the orders *Leguminosæ* and *Compositæ*, but there are several other more remarkable plants among them, notably a grass (*Tristachya*) with a singularly bearded inflorescence, an erect species of *Gloriosa*, several *Asclepiads*, and a fine species of *Tachiadenus*, a genus of the *Gentianeæ*, previously only known to inhabit Madagascar.

Books recently presented to the Library.—Professor C. S. Sargent has presented a copy of his *Forest Flora of Japan;* Mrs. Gray has presented the *Letters of Asa Gray;* Mr. W. Martin Conway, who gave the collection of dried plants made on his Karakoram expeditions, has now sent a copy of the *Scientific Reports* connected therewith; the Board of Agriculture has presented a set of the *Rothamsted Memoirs* by Lawes and Gilbert; from the Trustees of the British Museum a copy of Lister's *Monograph of the Mycetozoa* has been received; Dr. Gregorio Chil has presented De Viera's *Diccionario de Historia Natural de las Islas Canarias;* from the author, E. Raoul, came two copies of *Culture du Caféier;* from the authors, E. L. Rand and J. H. Redfield, the *Flora of Mount Desert Island, Maine;* from the author, T. R. Sim, *Sketch and Check-list of the Flora of Kaffraria;* and from Professor J. W. H. Trail a copy of *The Little English Flora* has been received.

Through the Bentham Trustees Kew has also been able to complete the sets of the publications of various foreign botanical societies. Among the more important are the *Verhandlungen der K. K. zoologisch-botanischen Gesellschaft in Wien*, from 1871 to 1894; the *Actes de la Société Linnéenne de Bordeaux*, from 1873 onward; the *Abhandlungen des naturwissenschaftlichen Vereines zu Bremen*, complete from the beginning; the *Arbeiten des Botanischen Museums zu Hamburg*, from the commencement; and the publications of the principal societies of Australia and New Zealand.

Typhoon in Hong Kong.—Extract from letter from Superindendent, Botanical Department, Hong Kong, to Royal Gardens, Kew, dated Hong Kong, October 16, 1894.

"On the 6th of this month Hong Kong was visited by a typhoon which was the worst experienced for exactly 20 years. Our gardens were terribly wrecked in 1874, and now they are again reduced to a scene of desolation. All our *large* trees have been either totally destroyed or reduced to little more than stumps or bare poles."

"Outside the Gardens the trees on the hills have come through pretty well, but the shade trees in the streets and roads have been terribly mutilated. Most of the roads and streets were blocked with fallen trees and broken limbs."

"Between September 10th and October 6th we had to prepare for five typhoons which approached the Colony, but as the centres passed some distance south we had only strong gales for four of them."

Meadow Plume-Thistle (*Cnicus pratensis*, Willd.) — The plant known as the Meadow Plume-Thistle, *Cnicus pratensis*, Willd. (Carduus pratensis, *Huds.*) is a perennial, rather local in character, but found rather frequently in the southern counties of England. It is widely spread on the continent. The stems are downy and mostly single-flowered. The leaves are green above, cottony beneath, but not very white. The flowers are dark purple with the pappus dirty white.

The plant affects wet pastures in various parts of the country, and is often a troublesome weed. The following letter shows it has spread to such an extent in certain parts of Somersetshire as to render good pastures almost worthless. There is no use to which the plant could be applied, and it is evident that nothing can be done except to get rid of it by persistent weeding before the plants flower each year.

Mr. W. LANG to ROYAL GARDENS, KEW.

Curry Rivel, Somersetshire,
July 5th, 1894.

SIR,

BY this post I send you a plant the name of which I should be glad to know. Within the last few years it has spread and overrun a large tract of land in West Sedgmoor which formerly produced good pasture, but which is now in consequence worthless or nearly so for grass-growing purposes. There is, I suppose, no commercial value in the plant or any extract which might be got from it. The local name is pronounced something like "Tabbie-howe," but although I have tried to get at the origin I am unable to do so.

* * * * * *

I am, &c.
(Signed) W. LANG

The Director,
Royal Gardens, Kew.

Yam Beans.—Information respecting the Yam bean (*Pachyrhizus tuberosus*, Spreng.) was given in the *Kew Bulletin*, 1889, pp. 17 and 62 (with plate). An account of the closely-allied short-podded Yam bean (*Pachyrhizus angulatus*, Rich.) was given in the *Kew Bulletin*, 1889, p. 121 (with plate). Both these plants are of interest. The roots of the former "afford a plentiful supply of very wholesome food"; while, according to Dr. Trimen, "the pods are a very useful vegetable." Of the short-podded Yam bean a starch is made from the tubers, or they are eaten when young as in the case of *P. tuberosus*. The young pods, however, cannot be used as a vegetable, as they are hairy and cause irritation. The following analysis of tubers and seed of *P. tuberosus* has recently been published in the *Report of Agricultural Work at*

British Guiana, by Messrs. Harrison and Jenman, for the years 1891–92, p. 70 :—

Pachyrhizus tuberosus and P. angulatus.—"Yam beans." These two species are little cultivated, and only for the tuberous roots, the beans, when mature being, in a measure poisonous. They have been used, however, when very young, sliced and cooked as French beans are used. The tubers of *P. tuberosus* grow as large as a medium or large sized turnip, are as poor in quality, and without the good flavour. The other produces larger tubers if allowed to go on from year to year, the plants being perennials. One species is dwarf, growing about a foot high, while the other is several feet high, requiring a hedge or trellis to grow upon. They are of American origin but now widely dispersed in all equatorial and warm countries.

YAM BEAN. (PACHYRHIZUS TUBEROSUS.)

—	Tubers.	Seed.
Water - - - - -	82·25	13·50
Fats - - - - -	·30	25·04
Resin - - - - -	·13	2·14
*Albuminoids - - - -	1·05	20·94
Sucrose - - - -	1·29	6·95
Glucose - - - - - -	·26	·31
Pectose, gums, &c. - - -	1·62	1·58
Starch - - - -	8·46	9·00
Digestible fibre - - - - -	2·14	12·20
Woody fibre - - - -	·66	4·43
Mineral matters - - - - -	1·84	3·91
	100·00	100·00
Containing nitrogen - - - -	·166	3·35

* Both the tubers and beans contain a poisonous resin, the latter yielding over two per cent. of it. This resin was found to be a very active fish poison. Apart from the presence of this substance, the beans exhibit a very high value as food stuffs, much resembling in composition the celebrated Soy-bean (*Glycine Soja*).

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 99.] MARCH. [1895.

CCCCXLVI.—BOTANICAL GARDENS IN SOUTH AFRICA.

In the *Kew Bulletin* for January 1892, pp. 10–14, the change made in the character and function of the Botanic Garden at Cape Town was noticed. This institution was no longer to be a Botanic Garden, but simply a town garden supported by municipal rates. The change at Cape Town has now been followed at King William's Town, in the Eastern Province of the Colony. This garden was under the charge of Mr. Thomas R. Sim, a capable horticulturist, who was formerly trained at Kew. During his residence in South Africa Mr. Sim published a very useful work on " The Ferns of South Africa, containing descriptions and (159) figures of the ferns and fern-allies, with localities and cultural notes." [London: Wesley & Son, 1892.] More recently he has printed a " Check list of the indigenous plants of Kaffraria."

Consequent upon the change in the control of the garden at King William's Town, Mr. Sim has now left it, and accepted an appointment under the Forest Department.

The history of the Botanic Gardens in South Africa shows that they differed in many ways from such institutions as they exist in other countries. The Cape gardens were only partially supported by Government, and they had to look to receipts from the sale of seeds and plants to meet their current expenditure. The position is described in the *Annual Report* of the Cape Town Botanic Garden for 1883, p. 1:—" The garden is kept going mainly by the mercantile profits of the seed store. Its income, and consequent power to repair, rebuild, and improve, decrease as business stagnates. There is no elasticity in the revenue except in that which comes of our commercial earnings. The grant from Government remains the same, though meted out in accordance with the poverty of the Colony in 1849. The subscription list has never kept pace with the great increase of the population of Cape Town." Conducted on these lines it was inevitable that the gardens should be regarded as interfering unduly with private enterprise, while their scientific character was completely overlooked. A properly equipped Botanic Garden, devoted to scientific work and carrying on experimental cultivation, appears never to have existed in Cape Colony.

Mo. Bot. Garden

Mr. John Horne, F.L.S., when Director of the Forests and Botanic Gardens of Mauritius, visited the Cape in 1883. His impressions of the Botanic Gardens were as follows:—

"When in Africa I travelled from Algoa Bay overland to Cape Town by post cart and train. I visited all the Botanic Gardens at the Cape, namely, Port Elizabeth, Graham's Town, and Cape Town. They, in many respects, are most disappointing, being Botanic Gardens merely in name. The directors and curators are not to blame for this, but the gardens have to justify their existence and support themselves by the sale of plants. They are simply nursery establishments, and the stock on hand generally speaking is such as one finds in the nurseries at home, stove or tropical plants excepted. They seem to supply a want, the Graham's Town one especially, in supplying the colonists with flowers, shrubs, and useful fruiting and flowering trees. Should, however, a stranger like myself, wish to see African plants he need not look in these gardens for them. There are not many of them in any of these gardens. He must go to the 'Bush' and the 'Veldt' to find them. This surprised me very much indeed. For many of these are far prettier than a great deal of the flowering exotic 'stuff' which is introduced, grown and propagated with so much pains and trouble. And many of them are far more interesting from their grotesque appearance and as botanical curiosities (if one may use the expression) than are to be found in any other country, the Cacti of Mexico perhaps excepted."

The Cape Gardens have hitherto had little to do with the introduction and distribution of economic plants or the dissemination of information respecting such subjects for the use of the general community.

What has been attempted in this direction was owing entirely to the personal efforts of the curators. The following extract from Professor MacOwan's *Report* for 1883, pp. 3–4, shows how much more might have been accomplished if the funds at his command had allowed:—

"The garden has been able to supply many demands made upon it by similar institutions at home and abroad and numerous private collectors, for things scarcely in the usual run of trade supply, partly gratis and partly by sale. Thus duplicate palms and other fine conservatory plants have been furnished to the Port Elizabeth Park Committee, vine-cuttings on a large scale for experimental viticulture in the Transkei, seeds of *Cinchona ledgeriana* to most of the Cape Botanic Gardens, Olives, *Reana*, and *Sorghum* to many private planters. Several enterprising cultivators are now, at our suggestion, trying to multiply the thornless *Opuntia* and the *spek-boom* in Namaqualand, Angra Pequena, and elsewhere. I think these excellent food plants have not received the attention they deserve. Of course they are special food plants, suited to special localities, and do not come into competition with the ordinary *veldt-bosjes* and grass wherever the climatic conditions permit the usual pasturage. But I am sure that should the *spek-boom* be incapable of acclimatisation on the sun-smitten randts of Namaqualand, the *Opuntia* may be grown in vast thickets at the junction of rock and sand veldt, and its use would save much of the present expenditure in importing compressed hay for trek-cattle. Such culture throughout all karroid districts of the Colony subject to frequent failure of seasonable rains is far more important than the introduction of any more of the fancy staples which are from time to time proposed, praised, and forgotten, and which have given point to the proverbial sneer that "the Cape is a country of samples." I wish it could be added that these supplies and others to the Government Forest Department were all made gratis.

Unfortunately the garden has ***to sell in order to live.*** We have therefore to demand money for exactly those things which are raised for free distribution in every Colony except ours. But in every Colony except ours the Botanic Gardens are entirely maintained by the State, enjoy the serene independence which enables them to give out of their abundance, and know nothing of the perpetual fight against insolvency which we share with the small shop-keeper.

"The demand for information on points of culture and introduction of new experimental plants is incessant. A few of these inquiries have reached us through the Government, and have been dealt with in quasi-official reports, but the mass of them come in the ordinary correspondence of the garden, and absorb a great amount of time *without any return.* Inquirers are often inconsiderate. Sometimes several letters involving research are required, our advice is taken, and is carried out at a rival seed store. We have not the right of franking such correspondence, and almost invariably have to pay the postage for our pains. It is a pity that the bulk of the inquiries shows a tendency to try tropical and sub-tropical cultures for which the climatic conditions of the Cape are prohibitive, and the available labour too high priced. Cacao, arrowroot, ginger, opium, *Cinchona*, tea, *Furcræa* fibre, *Phormium* and rice ; upon these and the like speculation has been rife. I wish there were the same curiosity about ascertaining the special fitness of this or that variety of wheat, barley, or maize for this or that soil, or about originating improved strains of potato from seedlings—anything, in fact, which will result in produce rather than in samples. Occasionally important matters have turned up in course of correspondence. For example, the occurrence of the destructive *Cuscuta Trifolii*, Bab., or 'Dodder,' among colonial crops of Lucerne has been signalised. This mischief is, no doubt, a result of the importation of cheap unsifted seed. Whether the measures earnestly pressed upon the cultivators will be carried out to the extirpation of the pest remains to be seen. In view of the great value of Lucerne to the ostrich-farming industry, and the swift destruction of the crop by the parasite, should it become naturalised, I am of opinion that a stringent Act for the extirpation of *Cuscuta* is more needed than that against the *Xanthium spinosum*. In case of the latter, legislation perhaps sharing the proverbial blindness of justice, singled out for destruction the large grained burr-weed, but failed to denounce the smaller yet more mischievous *Echinospermum*, or 'carrot seed' of the farmers, the archimedian screw-twist of prickles borne by the *Medicago* for the confusion of wool-combers, and the brittle *Asparagus* of the Karoo, whose twigs tangle the mohair of our Angoras. It might be well to issue by authoritative proclamation a statement of the destructive effect of *Cuscuta* upon Lucerne and other leguminous crops, followed by details of the mode of stamping out the parasite, and a recommendation to magistrates and field-cornets to be on the watch for its appearance. Being introduced from Europe in imported seed, it may appear sporadically in any part of the Colony."

At the present moment Cape Colony is the only important British possession which does not possess a fully equipped Botanical Institution. It is true it possesses a fine colonial herbarium under the competent charge of Professor MacOwan and an agricultural department which he efficiently advises on botanical subjects. But beyond this it has no central authority dealing with the practical aspects of the science of botany, and no gardens under technical control where careful experimental cultivation could be carried on or where special seeds and plants could be obtained for starting new industries. This condition of affairs is scarcely credible to a large and wealthy community like that at the Cape. The town gardens now established in the more important centres of population in Cape Colony are likely to be useful as breathing spaces, and as ornamental adjuncts to public buildings. As purely pleasure gardens, supported by the municipality out of the local rates, they will also have their own special value. It was entirely a misnomer to call them Botanic gardens, and it is as well that the name was changed and their proper character officially recognised.

Something, however, more than an ornamental garden, dotted here and there, is required in South Africa. A central establishment in the neighbourhood of Cape Town devoted to the scientific study and experimental cultivation of plants, fully equipped to discharge its studies as a national institution on the lines of Kew, would alone be worthy of the future of South Africa.

The flora of this part of the world is one of extreme interest. It deserves to be carefully and exhaustively studied, and numerous plants, now in danger of becoming extinct, should be preserved in some central spot for the observation of students. Of the economic influences of such a central institution it is needless to enlarge. There are hundreds of problems connected with the cultivation of industrial plants in South Africa awaiting solution, and these could only be dealt with at an institution specially devoted to scientific research, where careful trials could be conducted extending over many years. As affording the most recent information on the subject, the following letter received from Mr. Thomas R. Sim, on resigning charge of the King William's Town Garden, is reproduced:—

CURATOR, BOTANIC GARDEN, KING WILLIAM'S TOWN, to ROYAL GARDENS, KEW.

Botanic Garden, King William's Town,
June 30, 1894.

DEAR SIR,

I HAVE to thank you for seeds received some time ago, but since I last wrote you. Since then we have been slowly but gradually progressing with the arrangements—of which I have spoken to you ever since I came out—for passing the garden into the care of the Borough Corporation, and now that is nearly accomplished. The garden will then become like those of Port Elizabeth and Cape Town, a town garden pure and simple, without any pretence of having a botanical or experimental connexion. In past years, though they had the botanical name, I cannot say that they had very much connexion with botany, except in so far as I myself chose to carry out studies during extra hours, and as the experimental work has been gradually given up here, as it was being taken up by the Agricultural Department, I think there is little reason to regret that one more of the Botanic Gardens is, as such, passing out of existence, and taking the name and character which would have better suited it for the greater part of its existence.

Indeed, what we are in want of most is one really good botanical and experimental garden for the Colony, equipped so that it shall not have to earn any part of its own maintenance, and then allow each town to have its own town garden, public park, or whatever the local circumstances most demand. Meantime we have none such, and any endeavours made by me to develop the experimental side of this establishment have constantly been held in check by the stern necessity for first earning our bread and butter, and even in that our efforts have been stultified by the care of a swimming bath, on which we have lost 900*l.* during the past nine years or so during which it has existed.

The transfer will be effected in about two months time, and as I could not see any prospect of the place being worth holding, or of its offering any opportunity for good work, I have accepted an appointment in the Forest Department, in charge of the nurseries and plantations at Fort Cunynghame, by Dohne, which will be my address after September 1. The plantation is the most extensive one in the Colony, extending at present to about 1000 acres, and it is proposed to extend this to two or three times its present size in the near future. Attached to this is the nursery from which the public are supplied at cost rates, for the encouragement of tree planting, with young trees in large quantity. Also here are grown the vines imported by Government as Phylloxera proof or as stocks, and in various other ways the establishment is being made one of much public utility. The plantation is situated about 40 miles from here, further inland, and at an altitude of 2000 to 4000 feet, so I expect it to be much more healthy for my family than King William's Town has been.

I enclose a packet of *Microstephium*, a white-leaved plant, which may be of use along the south coast of England in bedding work.

(Signed) . . THOS. R. SIM.

CCCCXLVII.—DECADES KEWENSES.

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECAS XIV.

The following Decade is devoted to new species of ferns contained in the interesting collection made in Yunnan, Western China, by Mr. W. Hancock, F.L.S., already referred to in the *Kew Bulletin* (1895, page 45).

131. **Davallia (Leucostegia) pulcherrima,** *Baker* [Filices]: rhizomate breviter repenti, paleis basalibus lineari-subulatis sordide brunneis, stipitibus contiguis elongatis gracillimis nudis castaneis, frondibus oblongo-deltoideis parvis decompositis glabris viridibus modice firmis, pinnis lanceolatis basi inferiori cuneato-truncatis inferioribus haud reductis, segmentis ultimis linearibus uninerviis dissitis erecto-patentibus, soris oblongis ad vel infra apicem segmentorum ultimorum costalibus, indusio transversaliter oblongo lato glabro membranaceo persistente.

Habitat.—Yunnan; crevices of rocks near Mongtse, alt. 6000 feet, *Hancock*, 105.

Stipites 1–4 poll. longi. *Lamina* 2–4 poll. longa, deorsum 1½–2 poll. lata, segmentis ultimis ¼ lin. latis.

A very pretty little species, with the habit of a *Darea*, nearly allied to *Davallia Clarkei*, Baker, which has also been found in Yunnan.

132. **Cheilanthes (Eucheilanthes) Hancocki**, *Baker* [Filices]; paleis basalibus linearibus firmis castaneis, stipitibus elongatis fragilibus castaneis supra basin nudis, frondibus deltoideis glabris membranaceis decompositis utrinque viridibus, rachibus castaneis nudis, pinnis infimis reliquis multo majoribus dimidio inferiori valde producto, segmentis ultimis oblongis obtusis erecto-patentibus, soris contiguis, indusio membranaceo glabro orbiculari vel oblongo.

Habitat.—Yunnan, in shady glens near Mongtse, *Hancock*, 63.

Stipites 4–10 poll. longi. *Lamina* 5–6 poll. longa et lata.

Intermediate between the common Tropical Asiatic *C. tenuifolia*, Swartz, and the Japanese *C. Brandtii*, Franch. et Savat.

133. **Cheilanthes (Aleuritopteris), albofusca**, *Baker* [Filices]; paleis, basalibus lanceolatis firmis castaneis, stipitibus elongatis gracillimis nudis castaneis, frondibus firmis parvis deltoideis tripinnatifidis facie viridibus dorso albo-ceraceis, pinnis infimis reliquis multo majoribus dimidio inferiori valde productis, segmentis ultimis oblongis erecto-patentibus, soris crebris continuis, indusio lato brunneo continuo glabro persistente.

Habitat.—Yunnan; crevices of rocks near Mongtse, alt. 5700 feet, *Hancock*, 126.

Stipites 1–3 poll. longi. *Lamina* 2–3 poll. longa et lata, segmentis ultimis $\frac{1}{2}$–1 lin. latis.

A pretty little silver fern, intermediate between *C. farinosa* and *C. argentea*. We also have specimens, collected in Yunnan by Delavay.

134. **Polypodium (Phegopteris) dissitifolium**, *Baker* [Filices]; paleis basalibus magnis lanceolatis membranaceis ferrugineis, stipitibus nudis elongatis stramineis, frondibus oblongo-lanceolatis bipinnatifidis glabris modice firmis utrinque viridibus, pinnis lanceolatis caudatis profunde pinnatifidis inferioribus haud reductis brevissime petiolatis, pinnulis oblongis dentatis, venis pinnatis venulis 5–6 jugis simplicibus erecto-patentibus, soris marginalibus confertis parvis globosis superficialibus.

Habitat.—Yunnan, in a deep ravine near Mongtse, *Hancock*, 45.

Stipites pedales et ultra. *Lamina* sesquipedalis, deorsum 5–6 poll. lata, pinnis inferioribus basi 4–5 lin. latis.

Near the Tropical African *P. obtusilobum*, Desv.

135. **Polypodium (Phegopteris) apicidens**, *Baker* [Filices]; paleis basalibus lanceolatis membranaceis ferrugineis, stipitibus elongatis gracillimis nudis stramineis, frondibus oblongo-lanceolatis bipinnatifidis modice firmis utrinque viridibus glabris, pinnis lanceolatis caudatis profunde pinnatifidis inferioribus haud reductis brevissime petiolatis, venis pinnatis venulis 6–8 jugis simplicibus, soris parvis globosis superficialbus intramarginalibus.

Habitat.—Yunnan, in deep shady glens near Mongtse, *Hancock*, 87.

Stipites pedales. *Lamina* 8–12 poll. longa, 3–6 poll. lata, pinnis inferioribus 5–6 lin. latis.

Nearly allied to *P. obtusilobum* and the last species.

136. **Polypodium (Phegopteris) sphæropteroides,** *Baker* [Filices]; stipitibus elongatis stramineis paleis deflexis ovatis brunneis membranaceis vestitis, frondibus magnis deltoideis decompositis viridibus submembranaceis junioribus utrinque pubescentibus adultis calvatis, rachibus stramineis, pinnis pinnulisque oblongo-lanceolatis, segmentis ultimis oblique oblongis obtusis erecto-patentibus, venis in segmentis ultimis furcatis vel subpinnatis, soris parvis globosis superficialibus in segmentis ultimis sæpissime solitariis.

Habitat.—Yunnan; forests of the Great Black Mountains, near Mongtse, alt. 8500 feet, *Hancock*, 119.

"*Frondes* 5–7 pedales." *Pinnæ* infimæ 15–18 poll. longæ, 5–6 poll. latæ, pinnis 15–18 lin. latis, segmentis ultimis ½ lin. latis.

A large finely-cut plant, allied to *P. ornatum*, Wall.

137. **Polypodium (Phymatodes) macrosphærum,** *Baker* [Filices]; rhizomate late repenti calvato, stipitibus brevibus nudis, frondibus lanceolatis simplicibus subcoriaceis facie viridibus nudis dorso pallide viridibus paleis paucis sparcis peltatis brunneis membranaceis decoratis, venis primariis gracilibus flexuosis intra marginem dissolutis, venulis intermediis copiose anastomosantibus, soris magnis globosis marginalibus superficialibus supra medium laminæ præsertim productis.

Habitat.—Yunnan, on limestone rocks, near Mongtse, alt. 6200 feet, *Hancock*, 49.

Stipites 1–6 poll. longi. *Lamina* pedalis vel sesquipedalis, medio 12–15 lin. lata.

Near *P. longifolium*, Mett. and *P. angustatum*, Sw.

138. **Polypodium (Phymatodes) subimmersum,** *Baker*; [Filices]; rhizomate breviter repenti, frondibus subsessilibus contiguis linearibus integris glabris viridibus subcoriaceis e medio ad basin et apicem sensim attenuatis, venulis immersis occultis anastomosantibus, soris subimmersis oblongis vel globosis marginalibus vel leviter intermarginalibus remotis inter costam et marginem uniseriatis.

Habitat.—Yunnan, on the Great Black Mountains, on trunks of trees, alt. 9000 feet, *Hancock*, 92.

Lamina pedalis vel sesquipedalis, medio 5–6 lin. lata.

Nearly allied to the Australian and Polynesian *P. Brownii*, Wickst.

139. **Polypodium (Phymatodes) griseo-nigrum,** *Baker*; [Filices]; rhizomate repenti, paleis dense imbricatis lanceolatis firmulis sordide brunneis, stipitibus erectis elongatis nudis castaneis, frondibus coriaceis glabris oblongis parvis simpliciter pinnatis, rachi castaneo ad basin angustissime alato, pinnis lanceolatis subintegris basi dilatatis decurrentibus fertilibus subobtusis sterilibus obtusis, venis primariis nigris erecto-patentibus parallelis ad marginem rectis perspicuis, venulis anastomosantibus, soris magnis globosis superficialibus uniseriatis.

Habitat.—Yunnan, on grassy mountain slopes, alt. 6300 feet, *Hancock*, 67.

Stipites 8–9 poll. longi. *Lamina* 4–6 poll. longa, 2–3 poll. lata, pinnis basi 4–5 lin. latis.

Near *P. ebenipes*, Hook.

140. Polypodium (Pleuridium) arenarium, *Baker* [Filices]; rhizomate late repenti, paleis densis patentibus membranaceis lanceolatis ferrugineis, stipitibus elongatis strictis nudis stramineis, frondibus lanceolatis simplicibus rigide subcoriaceis facie viridibus dorso glaucescentibus, venis primariis perspicuis erecto-patentibus intra marginem dissolutis, venulis intermediis copiose anastomosantibus, soris magnis globosis superficialibus inter costam et marginem uniseriatis medialibus inter venas primarias solitariis.

Habitat.—Yunnan, on sandstone amongst grass near Mongtse, *Hancock*, 44.

Stipites 4–5 poll. longi. *Lamina* 6–8 poll. longa, 5–7 lin. lata.

Very near the New Caledonian and Australian *P. lanceola*, Mett.

CCCCXLVIII.—BOTANICAL SURVEY OF INDIA.

A scheme for carrying out the botanical survey of India was published on February 26, 1891, by the Government of India. It is under the control of Dr. George King, F.R.S., C.I.E., Superintendent of the Royal Botanical Gardens, Calcutta, who is Director.

Under his direction the publication of "Records of the Botanical Survey of India" has been commenced and four numbers have been issued.

The report of a botanical tour in Kashmir during 1893 by Mr. J. F. Duthie, F.L.S., Director of the Botanical Department of Northern India forms No. 3. It is accompanied by a map showing the parts of Kashmir, Baltistan, and Gilgit visited by Mr. Duthie in 1892 and 1893.

No. 4 contains the notes of a journey from Haveri to Kumta, in Bombay, by Mr. G. Marshall Woodrow, Lecturer on Botany at the College of Science at Poona; and of a tour in Travancore by Mr. M. A. Lawson, F.L.S., Government Botanist, Madras. During 1893 the route taken by Mr. Duthie was from Rawal Pindi to Gulmarg and the Liddar valley, thence over the watershed by the Yamharu pass into the Sind valley, and over Toji La to Drás. From Dras the route was along the little-frequented road to Gurais *viâ* Tilail, thence over the Dorikun pass to the Deosai plains and back by the same route. The following extracts are taken from Mr. Duthie's report:—

Beyond the valley above Chatpani, Mr. Duthie states:—

"We had now reached an elevation of about 13,000 feet, and as the ground looked very promising for botany, I decided to halt here for the night, so as to have the whole of the next day for studying the vegetation of the pass. I collected a great number of plants and seeds that evening at the head of the valley.

"The next day (August 30th) was beautifully fine, with a cloudless sky. The top of the pass was soon reached by a steep but easy path over turf. The elevation of this pass is close under 14,000 feet. I can find no name given for it in any maps, but it is known by the Drás people as the Kargeh pass. The view looking down the valley towards Tilail, is very fine, with Nanga Parbat in the distance. On the pass itself there was very little snow, and the turf was studded with brilliantly-coloured alpine flowers." (pp. 31 and 32.)

"At the lower and western end of the Gurais valley, where the river begins to turn southwards in the direction of Kanzalwán, is a remarkable forest composed chiefly of the white poplar (*Populus alba*); and about a quarter of a mile lower down the valley, and on the same side of the river (the left bank), there is a similar piece of forest. The trees are growing close together, and when viewed from the steep hill above, their tops present a level mass of compact foliage, a few individual trees projecting here and there. The chief interest attached to this forest is the large size of the trees, their average height being over 100 feet. Mr. W. Mitchell, who happened to be at Gurais at the time, kindly assisted me in making some measurements. The largest specimen we could find was 127½ feet high and 16 feet in girth at 7 feet from the ground. In the 'Forest Flora of North-west and Central India,' Sir D. Brandis gives the maximum size of *Populus alba* in India as 40 feet in height and 8 feet in girth.

"The undergrowth of this forest is composed chiefly of a tall handsome *Senecio* (*S. chenopodifolius*) and a low-growing kind of bramble. A few isolated specimens of pine, spruce, and silver fir are met with; also *Populus ciliata*, two species of willow, *Cratægus Oxyacantha*, *Viburnum fœtens*, and *Hippophae rhamnoides*; this latter forms large thickets a little higher up the valley." (p. 34.)

The furthest point reached into the Deosai plains was the mountain lake of Shersan, very deep, and said to contain fish. The weather was abnormally warm for the elevation, and the vegetation was dried up.

"I returned to Chilam the next morning, and on the following day (17th) crossed the Dorikun pass in a storm of wind and sleet, and reached Minimarg the same evening. I halted here for a day to dry the tents, and this gave me an opportunity of exploring some forest ground on the further side of the stream. The most interesting discovery here was that of *Pyrola secunda*, a species which had not been recorded for India previous to my finding it in the Astor valley in 1892. The undergrowth in this forest is composed chiefly of a variety of *Rubus niveus*, with red fruit tasting exactly like that of the raspberry, and of black-currant bushes with their branches bent down with the weight of the fruit. Another kind of bramble (*R. saxutilis*), with scarlet fruit, is also abundant here. The natives call it '*popé*.' A large number of interesting mosses were collected here." (p. 36.)

Among the notes on some of the economic plants met with in Kashmir and in the districts of Baltistan and Gilgit Mr. Duthie mentions the following:—

"*Ferula jaeschkeana*, Vatke; vern. *Apatkanphur* (Sind valley), *kangwa* (Pir Panjál).—A tall, handsome, umbelliferous plant, with yellow flowers, abundant in most of the valleys in Kashmir. This plant was at one time supposed to be a source of '*asafœtida*.' It resembles *F. Narthex*, Boiss., but has much larger fruit. The plant is said to be eaten by sheep and goats.

"*Ferula Narthex*, Boiss. (Narthex Asafœtida, *Falc.*)—Abundant in the Astor valley below Doian. I remember when on my way to Gilgit noticing this plant, only the dry bleached stems being then visible. There is a specimen in the Saharanpur herbarium collected by Dr. Giles in 1886, and probably from the same locality. I agree with Dr. Aitchison in considering this to be the plant which Dr. Falconer supposed to be the true source of the drug. The root is full of a resin which has a powerful scent of *asafœtida.* The plant is figured in the *Botanical Magazine,* t., 5168, and in Bentley and Trimen's *Medicinal Plants,* t. 126." (p. 40.)

"*Stipa sibirica,* Lamk.—This, which is known as the poisonous grass of Kashmir, is very abundant in some of the valleys, especially on the outskirts of the forests at an elevation of 8000 to 9000 feet. It occurs also in other parts of the Himalaya; and on the Black mountain in Hazara it was the cause of much sickness amongst the baggage ponies during the expedition of 1888. The direct cause of its injurious effects on animals has not yet been conclusively shown. Some attribute it to a narcotic principle inherent in the plant, whilst others affirm that it acts mechanically as an irritant, and is not in any way chemically poisonous. Dr. Aitchison, who has given much attention to the subject, and has witnessed many cases of ponies having been poisoned by eating this grass, believes that the symptoms are produced by some kind of narcotic poison. A common remedy in Kashmir for this complaint, Dr. Aitchison tells me, is to hold the animal's head in the smoke of a fire, in order to produce a discharge from the nostrils, after which the dangerous symptoms disappear, and the animal recovers consciousness. In addition to this treatment, vinegar and sour apples are sometimes given. The cattle of the country do not of their own accord eat this grass during the spring and summer, but in the autumn, Dr. Aitchison says, they do eat it. If this be so, it tells somewhat against the idea of the plant possessing only mechanically irritant properties, for during the autumn months the rough awns of the spikelets are fully developed." (p. 43.)

CCCCXLIX.—TEA CULTIVATION IN THE CAUCASUS.

Experiments with tea plants in the Russian province of Transcaucasia have been carried on for some time. In the Russian *Nouvelles* quoted by the *Board of Trade Journal* (1891, p. 174), it was stated that "the tea plant flourished on the western littoral of Transcaucasia, notably at Soukhourn. The tea shrubs planted in those districts reach normal dimensions and arrive at full maturity, producing excellent seeds. The climate of Western Caucasia compares favourably with that of the south-east of China. This analogy consists not only in the equality of the mean annual temperature of the two regions, but also in the quantity of rain which falls there and in the period (spring) when the rains are most abundant, a condition essential to the growth of the tea plant." It is added that a so-called Caucasian tea had been exhibited at the Nijni-Novgorod fair. "This was nothing else but *Vaccinium Arctostaphylos,* a kind of tea from Koporié, which only served to discredit the future plantations in Caucasia."

Latterly the tea plantations in the Caucasus have been extended, and "the quality of the tea produced is said to be good."

The Department of Crown Estates has appointed a Commission which will include the Inspector of the Imperial Domains in the

Caucasus, to proceed to India, Southern China, and Ceylon, with the object of thoroughly examining the methods of tea culture and curing in those countries. The Commercial Agent for the Appanage Department of the Russian Imperial Court has recently visited Kew to study the subject.

Some remarkable statistics as to the tea production of the world are given in a paper read by Mr. A. G. Stanton at the Society of Arts (*Journ.*, vol. 43, pp. 189–201). In 1883 the total consumption of tea in the United Kingdom was 170,780,000 lbs., or 4·82 lbs. per head of population. In 1894 these figures had risen to 214,341,044 lbs., or 5·53 lbs. per head.

The remarkable feature in the statistics is the way in which India and Ceylon have displaced China as a source of supply. Taking Mr. Stanton's per-centages, the proportions of the total supply stand as follows :—

—	China.	India.	Ceylon.
1883	66	33	1
1894	12	55	33

In 12 years Ceylon has pushed to the position at first occupied by India, and this almost entirely at the expense of China.

Mr. Stanton states :—"The annual consumption of tea in the civilised world, exclusive of the United Kingdom, is about 250,000,000 lbs. Of this quantity only about 30,000,000 lbs. are Indian and Ceylon." It is evident, then, that if Russian tea can be successfully placed upon the market, it will have, in the first instance at any rate, to compete with China tea. The new competitor is not likely seriously to affect British production.

As the experiment to grow tea in the Russian Empire possesses an interest in connexion with the large tea industries of India and Ceylon the following particulars are reproduced from the report for the year 1894 on the agricultural condition of the Batoum Consular district, lately forwarded to the Earl of Kimberley by Mr. Consul Stevens. [Foreign Office, Annual Series, 1894, No. 1481] :—

The tea plantations at Chakva, near Batoum, belonging to Messrs. K. and S. Popoff, tea merchants, of Moscow, have been considerably extended this year under the supervision of the Chinese tea planters, who were brought over in 1893; a large number, about 600, natives of the Caucasus, are also employed in working on the plantation of this firm.

In a letter to the "Caucasian Agricultural News," Mr. A. Solovtzoff, who for several years past has been cultivating tea on his estates at no great distance from the lands belonging to Messrs. Popoff, gives a somewhat interesting account of his experiences in the raising of this plant since the year 1884. He states that at that time his chief concern was the question of procuring tea plants for planting, he feared to order seed lest old seed should be sent, besides this the seed of tea contains a volatile oil in considerable quantity which, during a long voyage, would be likely to evaporate, and thus the seed would have been rendered sterile. Even the seed raised at Chakva requires the greatest care and attention, as excessive dryness deprives it of the oil, and too much damp causes it to rot.

Eventually, however, he succeeded in obtaining a few plants which arrived at Batoum in the month of July 1885, together with some seedlings. The condition of both left much to be desired, as they had received but little care and water during their transit, and were to a great extent damaged by the Customs authorities, who used quicklime for the purpose of disinfecting them against the importation of Phylloxera. They were, subsequently, transported to Chakva, and with as little delay as possible planted on his property. At first they grew badly, and all the shrubs dried up, but some of the seedlings took, and from these he was able to develop his plantation.

The land chosen for the plantation was a red clayey soil, dressed with a thin coat of manure composed of thoroughly rotted leaves and branches, &c. that had fallen from the trees. After clearing away the manure the land was dug up for a depth of about 21 inches and the top soil was worked to the bottom.

The seeds ripen in the course of a year, and are gathered in the month of October, at which time the plant also flowers. The seeds, after being collected, are strewed with dry sand and are kept in earthenware vessels. In March they are damped with a solution of camphor, spirits and water, in order to force their growth. The seeds are left damped with this solution for some hours, and are then put back into the earthenware vessels, after being mixed with damp earth In this earth the seeds begin to shoot up, and they are then transplanted into the nursery beds, the soil of which is the same as that of the plantation, but which has a certain proportion of sea sand admixed for the purpose of rendering it more friable. The seeds are sown at a distance of $3\frac{1}{2}$ inches apart at a depth of $1\frac{3}{4}$ inches. As soon as the young shoots make their appearance above ground it is necessary to cover them over with mats in order to protect them from the excessive heat of the sun; but this protection should be removed in rainy weather and at night. In dry weather the young seedlings have to be watered once a day, and under this system of cultivation it is found that every seed comes up. Mole crickets, however, create great havoc among the seeds. These insects, Mr. Solovtzoff says, are the only enemies of the seedlings with which he has to contend, and they are most difficult to deal with, although it would appear he has found means whereby the ravages caused by mole crickets may be minimised. The methods which he adopts to attain this end are the annual removal of the nursery beds to fresh ground, and the burying in the nursery beds, in a line with the burrows of the crickets, of grains of Indian corn boiled in a solution of arsenic, or, what is still better, a solution of corrosive sublimate.

The propagation of the tea plant by means of cuttings should be avoided, as a large proportion of the cuttings do not take, but the chief objection is that those that do only produce very weak plants.

Now that he has an almost unlimited supply of seedlings, Mr. Solovtzoff intends transplanting only the stronger ones into the plantation. The seedlings remain in the beds a whole year, and are then planted out 4 feet apart from each other.

The only attention which the plantation requires is that it should be freed from weeds twice a year. For the first year the young plants should be protected from the rays of the sun by the branches of trees. It has not yet been found necessary to artificially water the plants in the plantation. Up to the present, pruning, with a view to increasing the crop of leaves, has not been resorted to, as the chief object has been to obtain as large a quantity of seed as possible for the multiplication of the plants. No manure has been used hitherto, but when planting out the seedlings this year it was intended to manure the soil with timber ashes and refuse from oil mills.

During the dry season, May and June, when the heat is very great, the grown up plants stand the climate very well, but, as mentioned before, the young plants have to be protected from the sun. The winter of 1892–93 was exceptionally rigorous, the frosts being as severe as six degrees Reaumur, but neither the grown up plants nor the seedlings suffered in any war, although the latter were for several days covered with snow up to the very leaves. This result is particularly gratifying when the fact that the very young seedlings are planted in a quite open and low-lying plain fully exposed to the wind, is taken into consideration; when subsequently transferred to the plantation they do very well.

The plantation covers about five acres, and as planting has been carried on as seed has become available, it contains plants of all sizes, ranging from five years' growth to one and a half years' growth. The number of plants was 5150, and about 8000 seedlings were to be planted out during the present year, there is a sufficient quantity of seed in stock to raise 40,000 more seedlings, and the quality of the tea is said to be good.

It is also reported that about 43,000 acres of Government land in the neighbourhood of Chakva have recently been purchased by the Department of Crown Estates for the purpose of turning them into tea plantations, and in connexion with this, the above Department has ordered a Commission, which will include the Inspector of Imperial Domains in the Caucasus, to proceed, at the end of this year, to India, Southern China, and Ceylon, with the object of thoroughly studying the methods of tea culture in those countries.

CCCCL.—VACCINUM ARCTOSTAPHYLOS AS A TEA SUBSTITUTE.

With regard to the use of *Vaccinium Arctostaphylos* as a tea substitute in the Caucasus referred to in the preceding article, the following note contributed by the Director to the *Pharmaceutical Journal*, for March 21, 1885, is reproduced, to complete the history of the subject:—

Mr. Holmes's note in the *Pharmaceutical Journal* (January 17, pp. 573–4) pretty well exhausts the history of this curious product. But it will be convenient to record in the same pages the few other facts that have come under our notice at Kew.

In 1877, Mr. George Maw, F.L.S., brought from Asia Minor a small sample of tea obtained at Broussa in Anatolia. Mr. Maw informed us that it was sold for about 8*d.* per pound, and he ascertained that it was made from *Vaccinium Arctostaphylos* (*see* "Kew Report," 1877, p. 45). Mr. Holmes mentions on the authority of Mr. Allen, that in Lazistan and Trebizond it was first made in 1877; but in that year, at any rate in Anatolia, its use seems to have been sufficiently common to attract Mr. Maw's attention.

The tea next came under our notice in the report by Consul Biliotti, "On the town and port of Samsoon, and on the Circassian colony in the district."* Mr. Biliotti states that the Circassian families "consume large quantities of sugar and have introduced the use of tea; but there being a sort of native tea produced at Amassia and Tokat, the yearly importation of this article from Great Britain does not exceed 1500 pounds." We thought it was worth while drawing the attention of the Foreign Office to the matter, with a view of ascertaining the nature of this tea substitute. Mr. Biliotti took a good deal of trouble, and obtained and forwarded to Kew specimens of tea and of the plant producing it from Amassia and Tokat, in the province of Roum, and also from Rizeh in Trebizond. Writing from Trebizond, he says:—"As it grows profusely here wild on high mountains (not below an altitude of 500 feet, so far as I have been able to ascertain), it would be of invaluable advantage for the population to know whether the plant belongs to the genus tea, and whether cultivation would improve the quality of the tea now produced, which lacks in flavour. This may also be due to the natives using unskilful means for drying the leaves."

The tea sent has exactly the appearance and aroma of coarse black tea; so much so, that the Customs authorities insisted on charging duty upon it.

The specimens sent were identified by Professor Oliver as *Vaccinium Arctostaphylos*, without hesitation. He remarks that the plant is figured by Tournefort in his "Voyage in the Levant"; but though that traveller mentions the taste of the leaves, he says nothing about its being used as tea. This confirms what Mr. Holmes says as to its use for this purpose being a practice of recent date.

The Board of Trade, to whom samples of the tea were communicated, submitted them to Messrs. George White & Co., the well-known firm of tea brokers. They remark that common China tea, selling at 5½*d.* to 6*d.* per pound, shows better value in every respect, and the admixture of the "Trebizond tea" could hardly reduce the cost, while it would certainly not improve its flavour.

Though the aroma of the "Trebizond tea" was so agreeable, the taste of a decoction was harsh and mawkish, with no appreciable resemblance to that of true tea. I sent a sample to Dr. Schorlemmer, of Owens College, Manchester, who has paid some attention to the chemistry of tea-substitutes. *Ledum palustre*, belonging to the next natural family, *Ericaceæ*, yields Labrador tea, and it seems odd that two nearly related plants should be pitched upon in such distant parts of the world for the same purpose, if there were no physiological basis for their selection. But I have not heard whether Dr. Schorlemmer has detected any principle in Trebizond tea which would account for its extensive use.

Since the above was in type we have been favoured by the Board of Trade with a copy of a memorandum (dated January 15, 1885), by M. Numa Doulcet, H.M. Vice-Consul, at Samsoon.

I append a translation which, I think, finally exhausts the subject:—

1. The tea in question became a commercial article in 1880; at first its consumption was limited to the country and particularly to those districts in which Circassian colonies had been founded.
2. It is manufactured by Circassian planters in the neighbourhood of Amassia, Tokat, and Horek, all in the province of Roum, at a short distance from the forest which clothes the mountain

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* "Commercial Reports from Her Majesty's Consuls, 1884," Part. I., p. 147.

chain called Beldagh, and on which the plant which furnishes the tea in question grows in great abundance.

3. I have not been able to ascertain the process of manufacture which takes place within the houses of the Circassian colonists who undertake this industry, and who appear to be pretty numerous.
4. There are several crops of tea; that which yields the best quality takes place in May. About 5000 ocques (the ocque$=2\frac{3}{4}$ lbs.) are actually manufactured annually, but this quantity could be considerably augmented if there were occasion for it.
5. When fit to yield a crop the plant has reached a shrubby state.
6. The tea is sold on the spot at about five piastres per ocque. The cost of transport to Samsoon might amount to about one piastre, which brings the price per ocque to six piastres in that town.
7. The consumption is almost limited to the requirements of the Vilayets of Sivaz (Roum) and Angora (Anatolia). It is to the town bearing the last-mentioned named that the greater part of the crop is sent. In 1881 a consignment was sent to France, but the transaction was not a profitable one. Some further consignments to Constantinople also do not appear to have been successful.

CCCCLI.—DIAGNOSES AFRICANÆ, IV.

(*Continued from p.* 129, 1894.)

The plants described below form part of a collection made by Mr. A. Carson, B.Sc., of the London Missionary Society, and presented by him to Kew. They are from a place called Fwambo, situated about 50 miles south of Lake Tanganyika, and evidently the greater part of them from a considerable elevation, as they are temperate and sub-tropical types. Mr. Carson's labels afford no information on this point however, but as the level of the lake is given as 2670 feet above the sea, and the plateau at 4000 to 5000 feet, with higher peaks, it is probable that these plants were from elevations of 5000 to 7000 feet.

The following extract from Mr. H. H. Johnston's account of the country (*Proceedings of the Royal Geographical Society*, xii., 1890, p. 737) is interesting:—

"The ordinary route to Tanganyika, which I had now picked up in the Mambwe country, leads you up through the most beautiful gorge of Fwambo to and through the mountain ranges which look down on the south end of Tanganyika. The gorge of Fwambo is an exquisite bit of scenery. A beautiful stream dashes down in many cataracts and rapids through a deep but not very narrow gorge between precipitous mountain sides, and this gorge is filled with magnificent forest of a truly West African character, an ideal tropical forest with its immense umbrageous trees, its graceful oil-palms, its parasitic orchids, and trailing swinging creepers."

140. Oxalis trichophylla, *Baker* [Geraniaceæ]; acaulis, annua, foliis omnibus radicalibus trifoliolatis longe petiolatis, foliolis oblongis obtusis

utrinque dense persistenter albido-pilosis, pedunculo elongato piloso, floribus paucis umbellatis, pedicellis cernuis calyce longioribus, sepalis oblongo-lanceolatis pilosis, petalis obovato-oblongis calyce triplo longioribus superne lilacinis inferne luteis, genitalibus distincte triseriatis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (56 of 1894 collection).

Foliola 4–5 lin. longa. *Pedunculus* 4–5 poll. longus. *Sepala* 1½–2 lin. longa.

Near *O. corymbosa*, DC. and *O. purpurata*, Jacq.

141. **Oxalis oligotricha,** *Baker* [Geraniaceæ]; annua, acaulis, foliis radicalibus dense rosulatis longe petiolatis trifoliolatis, foliolis membranaceis oblongis vel ovato-oblongis obtusis utrinque parce pilosis, pedunculo elongato, floribus paucis umbellatis, bracteis parvis lanceolatis pilosis, pedicellis brevibus, sepalis oblongo-lanceolatis pilosis, petalis lilacinis calyce triplo longioribus, genitalibus triseriatis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (1890 collection).

Foliola 12–21 lin. longa, 9–12 lin. lata. *Pedunculus* 4–6 poll. longus. *Sepala* 2 lin. longa.

Near *O. corymbosa*, DC.

142. **Impatiens assurgens,** *Baker* [Geraniaceæ]; perennis, caulibus simplicibus erectis glabris superne pubescentibus, foliis sessilibus lanceolatis argute serratis basi rotundatis inferioribus oppositis superioribus alternis, floribus solitariis axillaribus longe pedunculatis, sepalis lateralibus parvis ovatis, labello albido concavo ore obliquo calcare brevi gracili, petalis albidis obovato-quadratis, ovario glabro ad apicem et basin sensim attenuato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (11 of 1893 collection, 15 and 105 of 1894 collection).

Caulis 1–2 pedalis. *Folia* 1½–2 poll. longa, 3–6 lin. lata. *Pedunculi* 1½–2 poll. longi. *Labellum* 1 poll. longum. *Petala* 4 lin. lata.

143. **Impatiens gomphophylla,** *Baker* [Geraniaceæ]; perennis, caulibus erectis glabris superne parce pilosis, foliis alternis breviter petiolatis oblongis acutis argute dentatis basi cuneatis facie viridibus glabris dorso pallide viridibus ad venas primarias pilosis, floribus axillaribus geminis longe pedunculatis, sepalis lateralibus parvis ovatis rubellis, labello infundibulari calcare spiraliter recurvato, petalis parvis orbicularibus, ovario glabro e medio ad basin et apicem angustato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (10 of 1893 collection, 7 of 1894 collection).

Folia 2–3 poll. longa, medio 9–12 lin. lata. *Pedunculi* 12–18 lin. longi. *Labellum* 12–15 lin. longum.

Near the West African *I. bicolor.*, Hook. fil. in *Bot. Mag.* tab. 5366.

144. **Crotalaria laxiflora,** *Baker* [Leguminosæ]; annua, ramosissima, glabra, stipulis minutis, foliis breviter petiolatis trifoliolatis, foliolis oblanceolatis obtusis vel cuspidatis utrinque viridibus, racemis laxis paucifloris terminalibus, bracteis linearibus minutis, pedicellis brevibus

ascendentibus vel patulis, calyce tubo obconico dentibus lanceolatis tubo longioribus, petalis luteis, vexillo obovato calyce duplo longiore, legumine sessili subgloboso monospermo glabro.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (28 of 1894 collection).

Caulis subpedalis erecta. *Foliola* 4–8 lin. longa. *Calyx* 2 lin. longus. *Corolla* 4 lin. longa. *Fructus* 2 lin. longus.

Belongs to the group *Sphærocarpæ*, near *C. filicaulis*, Welw.

145. **Indigofera polysphæra,** *Baker* [Leguminosæ]; fruticosa, ramosissima, caule erecto angulato adpresse piloso, stipulis linearibus minutis, foliis simplicibus subsessilibus lanceolatis acutis rigidulis utrinque viridibus obscure pilosis, floribus in capitulis densis globosis copiose paniculatis dispositis, pedicellis brevibus dense pilosis, bracteis lanceolatis, calyce dense piloso tubo brevissimo dentibus linearibus elongatis, legumine oblongo-cylindrico dense piloso 2–3-spermo calyce sesquilongiori.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (70 of 1894 collection).

Folia 2–3 poll longa, 3–4 lin. lata. *Calyx* 2 lin. longus. *Fructus* 3 lin. longus.

Near *I. procera*, Schum. & Thonn.; and *I. djurensis*, Schweinf.

146. **Desmodium (Nicolsonia) tanganyikense,** *Baker* [Leguminosæ]; suffruticosum, caulibus angulatis dense pubescentibus, stipulis linearibus falcatis, foliis sessilibus trifoliolatis subcoriaceis facie viridibus obscure pubescentibus dorso dense pubescentibus, foliolo terminali oblongo obtuso integro basi rotundato, racemis laxis in panicula magna efoliata dispositis, bracteis minutis, calyce tubo campanulato dentibus acutis tubo æquilongis, vexillo obovato rubello calyce triplo longiori, legumine lineari pubescente breviter pedicellato articulis circiter 3 longioribus quam latis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (27 of 1894 collection).

Foliola 3–4 poll longa. *Panicula* pedalis, racemis inferioribus 5–6 poll. longis. *Calyx* 1½ lin. longus.

Near *D. senaarense*, Schweinf.

147. **Mucuna erecta,** *Baker* [Leguminosæ]; erecta, fruticosa, ramulis lignosis angulosis dense breviter pubescentibus, stipulis deciduis, foliis trifoliolatis distincte petiolatis foliolis rigidulis oblongis obtusis utrinque dense adpresse pilosis, floribus 2–4-nis axillaribus, pedicellis brevibus dense pilosis, bracteis minutis, calyce dense brunneo-piloso tubo campanulato dentibus tubo longioribus supremo ovato inferioribus ovato-lanceolatis, petalis nigrescentibus, vexillo calyce 2–3-plo longiori, carina acuta recurvata calyce 3–4-plo longiore, ovario cylindrico piloso multiovulato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (66 of 1894 collection).

Foliola 2 poll. longa, 9–12 lin. lata. *Calyx* 4 lin. longus. *Carina* 14 lin. longa. *Vexillum* 9–10 lin. longum. *Fructus* ignotus.

The only species previously known with erect stems is the *M. stans*, Welw.

148. **Dolichos lupinoides**, *Baker* [Leguminosæ]; perennis, caule erecto simplice vel furcato dense persistenter albo-sericeo, foliis propriis hysteranthiis ignotis, rudimentariis bracteiformibus ovatis, floribus in racemo elongato denso dispositis, bracteis linearibus pilosis, pedicellis brevibus pilosis, calyce piloso tubo campanulato dentibus superioribus parvis, inferiori lanceolato tubo longiori, petalis pulchre purpureis calyce duplo longioribus, ovario cylindrico multiovulato dense piloso.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (133 of 1893 collection).

Caulis pedalis. *Racemus* 6–9 poll. longus. *Calyx* 3 lin. longus. *Petala* 6–7 lin. longa, vexillum 6 lin. latum.

This curious species has the dense raceme of a Lupin. It flowers in November, and at that season the stems bear only a few rudimentary bract-like simple sessile clasping pilose leaves below the inflorescence.

149. **Dolichos pteropus**, *Baker* [Leguminosæ]; perennis, caulibus erectis pubescentibus, stipulis lanceolatis rigidulis caducis, foliis simplicibus rigidulis obovatis obtusis vel emarginatis utrinque tenuiter pilosis, petiolo ala lata foliacea apice semilunari prædito, floribus 1–4nis in racemo laxo efoliato dispositis, bracteis linearibus parvis, calyce piloso tubo campanulato dentibus acutis tubo æquilongis, petalis pulchre purpureis calyce 2–3-plo. longioribus, ovario cylindrico multiovulato dense piloso.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (94 and 117 of 1893 collection).

Caulis pedalis. *Folia* 12–15 lin. longa, ala petioli 4 lin. lata. *Calyx* 3 lin. longus. *Petala* 7–8 lin. longa.

Remarkable for the very curious foliaceous wing of the petiole.

150. **Dolichos xiphophyllus**, *Baker* [Leguminosæ]; perennis, caulibus erectis pilosis, stipulis lanceolatis magnis rigidulis persistentibus, foliis paucis linearibus simplicibus ascendentibus subcoriaceis utrinque viridibus pilosis ad basin sensim angustatis, floribus axillaribus longe pedicellatis, calyce piloso tubo obconico dentibus inæquilongis deltoideis tubo brevioribus, petalis pulchre purpureis calyce triplo longioribus, ovario cylindrico piloso multiovulato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (46 and 71 of 1893 collection).

Caulis pedalis vel sesquipedalis. *Folia* 6–8 poll. longa, medio 2–3 lin. lata. *Calyx* 2 lin. longus. *Petala* 6 lin. longa. *Fructus* ignotus.

Nearly allied to *D. simplicifolius*, Hook. fil. in *Bot. Mag.* tab. 7318.

151. **Pentas involucrata**, *Baker* [Rubiaceæ]; perennis, caulo elongato parce ramoso hispidulo, stipulis profunde laciniatis, foliis oppositis rigidulis paucijugis lanceolatis ad basin sensim angustatis utrinque viridibus glabris, cymis densis multifloris terminalibus globosis basibus dilatatis foliorum superiorum involucratis, dentibus calycinis magnis

subulatis, corollæ tubo cylindrico calyce duplo longiori, limbi lobis parvis lanceolatis, staminibus ex tubo exsertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (40 of 1894 collection).

Caulis sesquipedalis vel bipedalis. *Folia* caulina 4–6 poll. longa. *Dentes* calycini 3 lin. longi. *Corollæ* tubus 6–7 lin. longus; limbi lobi 3 lin. longi.

Remarkable for the manner in which the connate bases of the upper pair of leaves are dilated so as to form a cup which encloses the base of the inflorescence.

152. **Pentas speciosa**, *Baker* [Rubiaceæ]; annua, caule simplici elongato dense pubescente, foliis ternatis breviter petiolatis ovatis acutis membranaceis utrinque pilosis facie viridibus dorso pallide viridibus, internodiis folio multo longioribus, cymis paucifloris terminalibus confertis, bracteis lanceolatis, foliaceis pubescentibus, calycis dentibus, magnis lanceolatis foliaceis, corollæ tubo gracillimo elongato apice abrupte dilatato, limbo pulchre rubello lobis magnis obovatis cuspidatis, antheris in tubo inclusis.

Habitat.—Lake Tanganyika; pool 20 miles south of Niomkoto, *A. Carson* (1888 collection).

Caulis 2–3 pedalis. *Folia* 1½–2 poll. longa. *Dentes* calycini 4 lin. longi. *Corollæ* tubus 15 lin. longus; limbus expansus 15 lin. diam.

Very distinct, with a much larger flower than in *P. carnea*, Benth. in *Bot. Mag.* tab. 4086, or in any other species already known.

153. **Pentas confertifolia**, *Baker* [Rubiaceæ]; perennis, caule simplici erecto pubescente, foliis in verticillis densis confertis sessilibus ascendentibus inæqualibus linearibus vel lanceolatis utrinque viridibus pubescentibus, cymis compositis densifloris terminalibus, bracteis linearibus pilosis, pedicellis brevissimis, ovario piloso globoso, dentibus calycinis parvis lanceolatis, corollæ tubo elongato cylindrico pubescente, limbi lobis brevibus lanceolatis, antheris ex tubo exsertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (23 of 1894 collection).

Caulis sesquipedalis vel bipedalis. *Folia* majora 2–2½ poll. longa, 2–3 lin. lata. *Corollæ* tubus 2 poll. longus, lobi 3 lin. longi.

Near *P. verticillata*, Schum.

154. **Oldenlandia macrodonta**, *Baker* [Rubiaceæ]; annua, caule erecto ramoso pubescente, stipulis membranaceis laciniatis basi breviter connatis, foliis sessilibus linearibus vel lanceolatis facie viridibus glabris dorso obscure pubescentibus, cymis paucifloris terminalibus, calycis dentibus linearibus, corollæ rubellæ tubo cylindrico fauce glabro, lobis oblongis tubo subæquilongis, antheris in tubo inclusis, fructu globoso magnitudine pisi dentibus calycinis persistentibus coronato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (107 of 1894 collection).

Caulis pedalis et ultra. *Folia* majora 2–2½ poll. longa, 2–4 lin. lata. *Dentes* calycini demum 2 lin. longi. *Corollæ* tubus 4 lin longus.

Nearly allied to *O. abyssinica*, Hiern.

155. **Fadogia triphylla,** *Baker* [Rubiaceæ]; perennis, caule erecto simplici glabro, stipulis deltoideis integris, foliis ternatis ascendentibus oblongis obtusis vel cuspidatis basi cuneatis subcoriaceis utrinque viridibus glabris, floribus in cymis paucifloris axillaribus pedunculatis dispositis, pedicellis brevibus erectis, calyce glabro campanulato obscure dentato, corollæ tubo calyce paulo longiori fauce pilosa, lobis ovatis tubo æquilongis, antheris ex tubo exsertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (43 of 1894 collection).

Caulis pedalis. *Folia* 1½–2½ poll. longa, 12–15 lin. lata. *Calyx* 2 lin. longus. *Corollæ* tubus 3 lin. longus.

Nearly allied to *F. glaberrima*, Schweinf. of Djur-land and *F. stenophylla*, Welw. of Angola.

156. **Galium stenophyllum,** *Baker* [Rubiaceæ]; perenne, caulibus erectis gracilibus profunde sulcatis plus minusve pilosis, foliis 6–8-nis anguste linearibus margine recurvatis, floribus terminalibus copiose paniculatis, pedicellis brevibus rectis, floribus parvis albidis rubro tinctis, petalis ovatis acutis, coccis globosis glabris nigris nitidis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (1889 collection, 40, 41 and 80 of 1893 collection). Nyassa land, *J. Buchanan* (770, 1358, 1364 of 1891 collection).

Caulis pedalis vel bipedalis. *Folia* 9–12 lin. longa. *Corolla* expansa 1½ lin. diam. *Cocci* 1 lin. diam.

Belongs to the section *Leiogalia*, near the European *G. lucidum*, All. The numbers cited vary greatly in indumentum and length of pedicel.

157. **Vernonia oocephala,** *Baker* [Compositæ]; fruticosa, ramosissima, ramulis lignosis pubescentibus crebre foliatis, foliis alternis brevissime petiolatis oblongis vel lineari-oblongis obtusis basi rotundatis rigidulis utrinque viridibus pubescentibus, capitulis paucifloris ad apicem ramulorum paucis congestis, involucro oblongo bracteis multiseriatis rigidis pallidis adpressis pubescentibus interioribus oblongis vel lineari-oblongis obtusis exterioribus parvis ovatis, pappi setis rigidis albidis ciliatis, acheniis pubescentibus.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (74 of 1894 collection).

Folia 12–18 lin. longa. *Involucrum* 4½ lin. longum, 2 lin. diam. *Pappus* 2½–3 lin. longus.

Closely resembles in habit the Brazilian *V. nitidula*, Less.

158. **Bojeria vestita,** *Baker* [Compositæ]; herbacea, perennis, caule foliato dense piloso, foliis subcoriaceis crenatis facie viridibus scabris dorso pallide viridibus pilosis inferioribus petiolatis oblongis obtusis basi cuneatis, intermediis sessilibus oblongo-spathulatis amplexicaulibus superioribus parvis oblongis, capitulis paucis magnis corymbosis, involucro campanulato bracteis pauciseriatis lanceolatis adpressis subfoliaceis dense pilosis, achenio cylindrico glabro, pappo albido rigidulo achenio 2–3-plo longiore.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (30 of 1894 collection).

Folia inferiora 8–9 poll. longa, 4–5 poll. lata. *Involucrum* 12–15 lin. diam. *Pappus* 2½ lin. longus.

Habit of *Inula Helenium*. The genus is very near *Inula*. Only two other species are already known, one from Madagascar and the other from the Cape.

159. **Emilia integrifolia**, *Baker* [Compositæ]; perennis, glabra, caule gracili erecto parce foliato, foliis caulinis alternis remotis linearibus integris sessilibus ascendentibus, capitulis paucifloris parvis pluribus laxe corymbosis, pedunculis nudis erectis, involucro oblongo, bracteis circiter 8 æqualibus linearibus viridibus albo marginatis, floribus pulchre purpureis involucro paulo longioribus, receptaculo plano, acheniis glabris brunneis arcte costatis, pappo albo molli achenio duplo longiori.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (102 of 1894 collection). Lower plateau north of Lake Nyassa, *Joseph Thomson.*

Caulis pedalis vel sesquipedalis. *Folia* caulina majora 2–3 poll. longa, 1½–2 lin. lata. *Involucrum* 2 lin. longum. *Achenia* ½ lin. longa.

Near *E. graminea*, DC. *and E. ascendens*, DC., both natives of Madagascar.

160. **Schizoglossum connatum**, *N. E. Brown* [Asclepiadeæ]; caule solitario erecto simplici pubescente, foliis erectis subsessilibus vel breviter petiolatis linearibus acutis marginibus revolutis utrinque pubescentibus, umbellis 6–10 sessilibus lateralibus 6–9-floris, bracteis subulatis cum pedicellis gracilibus calycibusque patule pubescentibus, sepalis patentibus lanceolatis acuminatis, corolla fere ad basin 5-loba lobis lanceolato-linearibus attenuatis erecto-incurvatis apicibusque connatis marginibus replicato-revolutis utrinque pubescentibus, coronæ lobis columnæ stamineæ æquilongis transverse oblongis vel subquadratis apice truncatis, sub-denticulatis angulis exterioribus in dentes breves productis extus basi transverse gibbosis intus bicarinatis et infra apicem cum dente parvo instructis glabris, antheris membranis inflexis suborbicularibus terminatis, stylo apice late truncato leviter 5-gibboso minutissime papilloso.

Habitat.—Fwambo, south of Lake Tanganyika, *Carson* 17.

Caulis 2 ped. altus, ¾–1 lin. crassus. *Foliorum petioli* ½–1 lin. longi, laminæ 2–2½ poll. longæ, ½–1 lin. latæ. *Bracteæ* 1–1½ lin. longæ. *Pedicelli* 1½–2 lin. longi. *Sepala* 1¼–1½ lin. longa. *Corollæ lobi* 3 lin. longi, basi 1 lin. lati. *Coronæ lobi* ¾ lin. longi et lati.

In habit this resembles *S. interruptum*, Schlecht. and *S. angustissimum*, Schum., but is at once distinguished from those and all other known species by the tips of the corolla lobes being connate, as in some species of *Ceropegia* and *Brachystelma*. The flowers appear to be of a greenish-yellow.

161. **Xysmalobium bellum**, *N. E. Brown* [Asclepiadeæ]; caule erecto robusto unifariam puberulo, foliis petiolatis cuneato-oblongis vel oblongis et basi cuneatis apice obtusissimis et minute apiculatis vel acutis utrinque glabris, umbellis plurimis lateralibus vel ad 1–2 terminalibus reductis inferioribus pedunculatis superioribus sessilibus 3–6-floris, pedunculis pedicellisque validis unifariam puberulis, bracteis lanceolatis acuminatis vel subulatis glabris, sepalis ovatis vel ovato-oblongis acutis glabris, corolla magna campanulata fere ad basin 5-loba lobis late oblongis obtusis intus intense purpureis interdum luteo-maculatis extus pallidis utrinque glabris, coronæ lobis supra staminum columnæ basin exortis et columnæ apicem attingentibus vel leviter excedentibus erectis crasso-carnosis turgidis apicibus obtusis vel

introrsim crasso-apiculatis dorso valde convexis ventro planis bicarinatis marginibusque ad apices alato-dentatis, antheris membranis inflexis late ovatis obtusis vel subacutis terminatis, stylo apice late truncato pentagono centro depresso.

Habitat.—East Tropical Africa: Blantyre, *Buchanan* 43; Nyassaland, *Buchanan* 603; Manganja Hills, *Kirk*; Fwambo, S. of Lake Tanganyika, *Carson* 62.

Caulis ultra pedem altus, 1½–3 lin. crassus. *Foliorum petioli* 3–4 lin. longi, laminæ 2–3½ poll. longæ, ¾–1¾ poll. latæ. *Pedunculi* 0–10 lin. longi. *Bractea* 2½–4 lin. longa. *Pedicelli* ¾–1¼ poll. longi. *Sepala* 3½–4½ lin. longa, 2 lin. lata. *Corollæ lobi* 10–13 lin. longi, 5½–7 lin. lati. *Coronæ lobi* 1¾–2 lin. longi. *Staminum columna* 3 lin. longa.

This is similar to *X. spathulatum*, Schum. in general appearance, but the flowers are larger, the coronal lobes reach to the top of the column or slightly overtop it and are different in form.

162. **Asclepias amabilis,** *N. E. Brown* [Asclepiadeæ]; caule gracili erecto simplici sparse puberulo vel subglabro, foliis erectis sessilibus vel subsessilibus linearibus acutis marginibus revolutis scaberulis, umbellis 2–3 pedunculatis 5–6 floris, pedunculis pedicellisque unifariam puberulis, bracteis subulatis, sepalis lanceolatis vel ovato-lanceolatis acutis puberulis ciliolatis, corolla rotata fere ad basin 5-loba lobis late ovatis acutis extus minute et sparse puberulis pallide purpureis intus glabris albidis, coronæ lobis paulo supra staminum columnæ basin exortis et columnæ apicem attingentibus cucullato-complicatis truncatis cum dentibus parvis erectis ad angulos interiores intus ecornutis basi truncatis, antheris membranis inflexis ovatis obtusis terminatis, stylo apice depresso-truncato pentagono.

Habitat.—East tropical Africa, Fwambo, S. of Lake Tanganyika, *Carson*, 35, 55.

Caulis 1–1½ ped. altus, ¾–1 lin. crassus. *Folia* 1½–3 poll. longa, ½–1¼ lin. lata. *Pedunculi* ½–2¼ poll. longi. *Bracteæ* 2–3 lin. longæ. *Pedicelli* 8–12 lin. longi. *Sepala* 2–2⅓ lin. longa. *Corolla* 9–10 lin. diam., lobis 4–4½ lin. longis, 2½ lin. latis. *Coronæ lobi* 1¼ lin. longi. *Staminum columna*, 1½ lin. longa.

163. **Tachiadenus continentalis,** *Baker* [Gentianeæ]; herbaceus, perennis, glaber, caulibus gracilibus erectis simplicibus vel furcatis, foliis oppositis sessilibus parvis ascendentibus lanceolatis vel oblongo-lanceolatis, calycis segmentis oblongo-lanceolatis acuminatis dorso carinatis, corollæ albidæ tubo cylindrico calyce 2–3-plo longiori, limbi lobis ovatis valde imbricatis, genitalibus in tubo inclusis, staminibus supra medium tubi insertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (33 of 1894 collection).

Caulis pedalis et ultra. *Folia* 6–9 lin. lata. *Calyx* 6–9 lin. longus. *Corollæ* limbus expansus 2 poll. diam.

Adds this fine genus, hitherto supposed to be confined to Madagascar, to the Continental flora. Nearly allied to *T. gracilis*, Griseb.

164. **Ipomœa (Orthipomœa) tanganyikensis,** *Baker* [Convolvulaceæ]; perennis, caulibus subrectis pubescentibus, foliis breviter petiolatis oblongis obtusis integris facie viridibus pilis paucis longis adpressis

vestitis dorso dense persistenter albo-sericeis, floribus pluribus in capitulo longe pedunculato aggregatis, bracteis parvis linearibus, sepalis lanceolatis pilis hispidis densissime vestitis, corollâ rubra infundibulari calyce duplo longiori.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (73 of 1894 collection). Also collected 20 years ago by Captain Lovett Cameron.

Folia 2–3 poll. longa, 6–12 lin. lata. *Calyx* 3 lin. longus.

Nearly allied to the West African *I. amœna,* Choisy.

165. **Buchnera quadrifaria,** *Baker* [Scrophularineæ]; annua, caulibus gracillimis erectis tetragonis glabris, foliis caulinis paucis minutis linearibus sessilibus strictis erectis, spicis 1–4 densissimis oblongis vel cylindricis tetragonis, bracteis late ovatis acutis rigidis glabris imbricatis quadrifariis, calyce glabro rigidulo bractea breviori, dentibus lanceolatis, corollæ tubo cylindrico bractea multo longiori, limbi lobis patulis oblongis basi cuneatis, genitalibus in tubo inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (100 of 1894 collection). Lower plateau north of Lake Nyassa, *Joseph Thomson*).

Caulis pedalis vel sesquipedalis. *Folia* 2–3 lin. longa. *Racemus* 9–18 lin. longus, bracteis 1½ lin. longis et latis. *Corollæ* tubus 5–6 lin. longus, limbus 3–4 lin. diam.

Very distinct by its slender rigid nearly naked stems and quadrifarious bracts.

166. **Clerodendron (Euclerodendron) tanganyikense,** *Baker* [Verbenaceæ]; fruticosum, erectum, caulibus dense pubescentibus, foliis oppositis breviter petiolatis oblongis cuspidatis subintegris facie viridibus subglabratis dorso pallide viridibus dense pubescentibus, cymis paucis axillaribus et in paniculam terminalem aggregatis, ramulis pedicellisque dense pubescentibus, bracteis lanceolatis minutis, calyce pubescente tubo oblongo dentibus parvis ovatis, corollæ tubo calyce duplo longiori, limbo parvo lobis orbicularibus, staminibus limbo duplo longioribus.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (52 of 1894 collection).

Folia 3–4 poll. longa, medio 2–2½ poll. lata. *Panicula* terminalis 2 poll. diam. *Calyx* 2 lin. longa. *Corollæ* limbus 3 lin. diam.

Takes rank amongst the small flowered species, near the Kilimanjaro *C. Johnstoni* Oliv. in *Trans. Linn. Soc.*, ser. 2, Bot. II., 346.

167. **Pycnostachys verticillatus,** *Baker* [Labiatæ]; herbaceus, perennis, caulibus ramosis pubescentibus, foliis parvis petiolatis verticillatis linearibus vel lanceolatis dentatis utrinque viridibus pubescentibus, racemis densissimis cylindricis, bracteis parvis ovatis, calyce piloso tubo brevissimo dentibus rigidis linearibus, corollæ tubo e calyce breviter exserto, labiis parvis, superiori oblongo, inferiori valde concavo, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (38 of 1894 collection).

Caulis 2–3-pedalis. *Folia* 6–9 lin. longa, 1–4 lin. lata. *Racemus* 6 lin. diam. *Calycis* dentes demum ¾–1 lin. longi. *Corolla* 3 lin. longa.

A smaller-flowered species than *P. parvifolius*, with longer racemes and shorter calyx-teeth.

168. **Pycnostachys parvifolius,** *Baker* [Labiatæ]; herbaceus, perennis, caulibus ramosis dense pubescentibus, foliis sessilibus oppositis vel pseudo-verticillatis parvis integris linearibus vel lanceolatis dense pubescentibus facie sordide viridibus dorso pallidioribus, racemis densissimis oblongis vel subglobosis, bracteis parvis linearibus, calyce piloso tubo brevissimo dentibus rigidis lineari-subulatis, corollæ tubo decurvato e calyce longe exserto, labio superiori parvo angusto, inferiori majori valde concavo, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (26, 34, 92, 103, of 1894 collection).

Caules sesquipedales vel bipedales. *Folia* majora 6–9 lin. longa. *Calycis* dentes demum 1½ lin. longi. *Corolla* 6–9 lin. longa.

A very distinct species, with leaves like those of the common Lavender, and much more capitate racemes than any of those previously known.

169. **Orthosiphon Cameroni,** *Baker* [Labiatæ]; perennis, caulibus erectis gracilibus dense pilosis, foliis paucis sessilibus lanceolatis obscure dentatis utrinque viridibus pilosis, racemis laxissimis, simplicibus, verticillastris paucifloris, bracteis minutis deciduis, pedicellis brevibus, calyce piloso tubo campanulato, dente superiori suborbiculari tubo breviori infimis parvis setaceis, corollæ tubo calyce duplo longiori labio inferiori obovato superiori multo majori, staminibus longe exsertis.

Habitat.—Lake Tanganyika, *A. Carson* (81 of 1893), and collected also 20 years ago in his journey across the continent by Captain Lovett Cameron.

Caulis sesquipedalis. *Folia* 2–3 poll. longa, 3 lin. lata. *Calyx* floriferus 3 lin. longus. *Corolla* 7–8 lin. longa.

Remarkable in the genus for its much-exserted stamens.

170. **Plectranthus betonicæfolius,** *Baker* [Labiatæ]; herbaceus, perennis, caule tenuiter albo-incano, foliis paucis longe petiolatis ovatis distincte crenatis facie viridibus tenuiter incanis dorso albo-incanis, pedunculo nudo elongato, racemis densis simplicibus cylindricis axi dense piloso, bracteis ovatis cuspidatis, calyce parvo dense persistenter purpureo-lanoso dentibus subæqualibus deltoideis, corollæ pubescentis tubo calyce multo longiori dimidio superiori late infundibulari, labio superiori parvo, inferiore magno valde concavo, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (64 and 79 of 1894 collection).

Caulis bipedalis et ultra. *Folia* inferiora 1½–2 poll. longa. *Racemus* 3 poll. longus. *Calyx* 1 lin. longus. *Corolla* 6–7 lin. longa.

171. **Plectranthus modestus,** *Baker* [Labiatæ]; annua, caulibus gracilibus erectis ramosis pubescentibus, foliis paucis sessilibus lanceolatis distincte crenatis utrinque viridibus glabris, racemis laxis simplicibus, verticillastris 2–3–floris, bracteis minutis, pedicellis calyce longioribus, calyce pubescente tubo campanulato dente supremo orbicu-

lari reliquis angustis acutis, corollæ tubo calyce duplo longiori, labio superiori parvo, inferiori magno concavo, staminibus inclusis.

Habitat.—Tanganyika plateau, *A. Carson* (1889 collection).

Caulis vix pedalis. *Folia* majora 1½–2 poll. longa. *Calyx* primum 1½ lin., fructiferus 4 lin. longus. *Corolla* 6 lin. longa.

Belongs to the section *Germanea*, and to series with cymes congested into umbels, so as to form a simple raceme.

172. **Plectranthus subacaulis,** *Baker* [Labiatæ]; perennis, foliis radicalibus plūribus sessilibus oblongis obtusis ad basin sensim angustatis utrinque viridibus glabris nigro-punctatis, caulibus brevibus simplicibus vel furcatis, foliis caulinis parvis bracteiformibus, floribus in spicis simplicibus subdensis dispositis, bracteis linearibus persistentibus foliaceis, calyce campanulato ore truncato, corolla pubescente tubo calyce multo longiori dimidio inferiori cylindrico dimidio superiori dilatato, labio inferiori parvo oblongo concavo superiori parvo recurvato, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (33 and 65 of 1893 collection).

Caulis 5–6 poll. longus. *Folia* radicalia 3–4 poll. longa, 9–12 lin. lata. *Calyx* ½ lin. longa. *Corolla* 4 lin. longa.

Very abnormal by its spicate inflorescence, truncate calyx, and corolla tube longer than the calyx; also by its sub-acaulescent habit. Perhaps it should rank as a new genus.

173. **Moræa ventricosa,** *Baker* [Irideæ]; caule elongato monocephalo, folio unicō basali producto lineari glabro rigidulo venis conspicuis, foliis superioribus bracteiformibus caulem vaginantibus, spathæ valvis magnis oblongis acutis, interiori exteriori multo longiori, pedicellis spatha brevioribus, ovario cylindrico, perianthio pallide luteo, tubo abortivo, segmentis omnibus obovatis obtusis longe unguiculatis, exterioribus reflexis, interioribus paulo brevioribus erectis, stigmatis appendicibus magnis oblongis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (37 of 1894 collection).

Cormus ignotus. *Caulis* sesquipedalis. *Folium* productum bipedale, 3 lin. latum. *Spathæ* valva interioris 4–4½ poll. longa, 9–12 lin. lata., *Perianthium* 2 poll. longum, segmentis omnibus supra medium 6–7 lin. latis.

Nearly allied to the Cape *M. spathacea*, Ker.

174. **Gladiolus oligophlebius,** *Baker* [Irideæ]; caule gracili elongato, foliis productis circiter 5 linearibus elongatis glabris graminoideis venis paucis remotis, spicis laxis simplicibus paucifloris, spathæ valva exteriori oblongo-lanceolata firma viridula, perianthio magno pallide rubello, tubo brevi infundibulari, lobis oblongo-lanceolatis acutis subæquilongis, staminibus limbo distincte brevioribus.

Habitat.—Abercorn, Lake Tanganyika, *Carson* (25 of 1893 collection).

Cormus ignotus. *Caulis* sesquipedalis. *Folia* pedalia et ultra, 4–5 lin. lata. *Spathæ* 18–21 lin. longæ. *Perianthii* tubus 9–12 lin. longus; lobi 2–2½ poll. longi.

Near *G. angustus*, Linn., and *G. Grantii*, Baker.

175. **Gladiolus caudatus,** *Baker* [Irideæ]; caule gracili elongato, foliis productis 4–5 elongatis linearibus glabris graminoideis, spicis laxis simplicibus paucifloris, spathæ valva exteriori oblongo-lanceolata firma viridula, perianthio pallido rubro tubo brevi infundibulari, lobis oblongis insigniter caudatis superioribus multo majoribus, staminibus limbo distincte brevioribus.

Habitat.—Fwambo, Lake Tanganyika, *Carson* (19 of 1893 collection).

Cormus ignotus. *Caulis* pedalis vel sesquipedalis. *Lamina* folii 6–12 poll. longa, 2–3 lin. lata. *Spathæ* 12–18 lin. longæ. *Perianthii* tubus 6–8 lin. longus; lobi superiores 2 poll. longi.

Allied to *G. angustus*, Linn., and *G. cuspidatus*, Jacq.

176. **Gladiolus gracillimus,** *Baker* [Irideæ]; cormo parvo globoso apice cancellato inferne fibris crassis parallelis vestito, caule stricto erecto gracillimo, foliis remotis longe vaginantibus superioribus lamina libera brevi lineari-subulata præditis, spicis simplicibus laxis secundis paucifloris, spathæ valva exteriori oblonga albo-viridi obtusa vel cuspidata, perianthio parvo lilacino, tubo brevi infundibulari, lobis oblongis acutis tubo duplo longioribus inferioribus superioribus longioribus, staminibus limbo distincte brevioribus.

Habitat.—Fwambo, Lake Tanganyika, *Carson* (118 of 1893 collection).

Cormus semipollicaris. *Caulis* pedalis vel sesquipedalis. *Lamina* producta folii superioris 2–3 poll. longa. *Spicæ* 2–3 poll. longæ. *Spathæ* 4–6 lin. longæ. *Perianthium* pollicare.

A very slender small-flowered species, allied to the Cape *G. gracilis*, Jacq.

177. **Gladiolus tritonioides,** *Baker* [Irideæ]; caule elongato, foliis 3–4 remotis inferioribus caulem vaginantibus superioribus lamina lineari brevi rigida producta, spicis laxis paucifloris simplicibus vel furcatis, spathæ valva exteriori ovato-lanceolata albo-brunnea interiori pallida obtusa membranacea, perianthio saturate purpureo, tubo brevi infundibulari, lobis ovatis acutis subconformibus tubo duplo longioribus, staminibus limbo distincte brevioribus.

Habitat.—Fwambo, Lake Tanganyika, *Carson* (37 of 1893 collection).

Cormus ignotus. *Caulis* 1½–2 pedalis. *Lamina* producta folii superioris 3–4 poll. longa. *Spica* 3–4 poll. longa. *Spathæ* 8–12 lin. longæ. *Perianthii* tubus 6 lin. longus; lobi pollicares.

Connects *Gladiolus* and *Tritonia*. Of the species of the former genus it looks most like *G. brevifolius*, Jacq.

178. **Gloriosa Carsoni,** *Baker* [Liliaceæ]; caulibus erectis crebre foliatis, foliis amplexicaulibus oblongo-lanceolatis apice acuminatis haud cirrhiferis, floribus pluribus laxe corymbosis, pedunculis nudis elongatis ascendentibus, perianthio cernuo splendide rubro segmentis arcte reflexis vix crispis oblongo-oblanceolatis unguiculatis apice acuminatis recurvatis margine luteis, staminibus patulis perianthio duplo brevioribus, stylo erecto vel arcuato apice stigmatoso breviter trifurcato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (53 of 1894 collection).

Caulis sesquipedalis. Folia superiora 4–5 poll. longa. *Perianthium* 2½ poll. longum, segmentis supra medium 6 lin. latis.

A very distinct novelty, with flowers like those of the finest forms of *G. virescens*, Lindl., but style not deflexed at the base, stem short and erect, and leaves not cirrhose at the tip. It would make a handsome garden plant.

179. **Tristachya decora**, *Stapf* [Gramineæ]; panicula ovata vel oblonga, interdum secunda, ramis gracilibus ad medium vel ultra erectis deinde abrupte patulis vel deflexis ad et supra curvaturam setis albis inæquilongis e tuberculis atris ortis dense barbatis, spicularum capitulis sub anthesi ovatis, gluma I. lanceolata caudato-acuminata secundum nervos setis vel setarum fasciculis e tuberculis atris ortis albis patulis vel deflexis ornata, gluma II. ovato-lanceolata longe acuminata glabra, gluma III. præcedenti simili setis utrinque 2 vel 3 brevibus exceptis glabra, ejus palea anguste oblonga applanata, gluma IV. oblongo-ovata basi utrinque fasciculo pilorum et ad medium serie obliqua fasciculorum ornata, ejus palea lanceolata acuta carinis cristatis inferne conniventibus canaliculum includentibus.

Habitat.—Fwambo, Tanganyika, A. Carson, 36.

Panicula 4–6 poll. longa, 2–3 poll. lata. *Capitula* (aristis exceptis) 9 lin. longa, 3–4 lin. lata. *Gluma* I. 9 lin. longa, setæ 3–4 lin. longæ; gluma I. et II. 6–7 lin., IV. 4 lin. longa; arista ad genu 4 lin., tota 10 lin. longa.

This species is nearest allied to *T. leucothrix*, Trin., a species known from Natal and the eastern part of the Cape Colony. It differs from it mainly in the smaller and broader heads of spikelets, the very long and stiff bristles of glume 1, the glabrous or almost glabrous glumes 2 and 3, the peculiar arrangement of the hairs of glume 4, and the shorter awns. Glume 1 is rather firm and light brown, whilst the tubercles from which the white bristles spring are of a pure black. The second and third glumes are yellowish brown, with green and prominent nerves. The fourth glume is much paler, and the nervation less marked. There are no leaves with the specimens except one sheath. It is glabrous, and bears at the mouth a dense line of short white hairs which represent the ligula.

CCCCLII.—MISCELLANEOUS NOTES.

HER MAJESTY THE QUEEN has been graciously pleased to allow the fences excluding the public from the **Palace Meadow** to be removed. This piece of ground is about 4½ acres in extent and when thrown open it will allow visitors a direct, instead of a circuitous, access to the finest part of the Arboretum.

The Royal Gardens are 251 acres in extent. It is not generally understood that they were originally the private property of the Crown, and not acquired out of public funds. The building used for the Herbarium and Library was sold to the nation by George IV. Access to the remainder has been step by step conceded to the public by the liberality and munificence of Her Majesty the Queen.

The successive stages may be briefly enumerated:—

The Botanic Garden, of which Sir William Hooker was appointed Director in 1841, comprised about 11 acres.

To this was almost immediately (1842) added between 3 and 4 acres about No. I. house, and the orangery (now No. III. Museum).

Soon after (1844), by permission of the Queen, 47 acres, including the piece of water in front of the Palm House, were added from the Pleasure Grounds for the formation of a Pinetum.

In 1846 the Royal Kitchen Gardens (14 acres) were abolished; a third of their area (about 5 acres), called Methold's Garden (it having originally belonged to Methold House, the Director's present official residence), was at once added to the Botanic Garden; another third abutting on the Richmond Road is now represented by the Herbaceous ground and the Propagating yard for the purpose of which many of the then existing fruit houses are still in use.

In 1851, the intervening third, the Kitchen Garden and Paddock, in the occupation of the King of Hanover, reverted to the Crown, and was added by the Queen to the Botanic Garden. The Pleasure Grounds and Gardens at Kew were in the occupation of the King of Hanover for sporting purposes at the time the Botanic Garden was given to the nation. The woods were filled with rough scrub for cover.

9th July 1845 they were placed in the charge of Sir William Hooker by the Woods and Forests. The intention was that they should be formed into a National Arboretum. A plan for the purpose was prepared (1846) by W. A. Nesfield; the main features were carried out at the time, and the general principle has been worked upon ever since.

30th March 1864 the Aboretum was finally thrown open to the public every day of the year except Christmas Day.

The following letter records the terms on which Her Majesty the Queen has been pleased to grant the further concession of access to the Palace Meadow.

BOARD OF GREEN CLOTH to HER MAJESTY'S OFFICE OF WORKS.

Board of Green Cloth,
Buckingham Palace, S.W.,
February 15, 1895.

SIR,

IN accordance with the representations made to the Lord Steward on various occasions by the First Commissioner of Works, that access to the Meadow in front of Kew Palace would greatly improve the arrangements for admitting the public to Kew Gardens, I have recently taken Her Majesty's pleasure on this point, and am honoured by the Queen's commands to intimate to you Her Majesty's consent to cede to your Department, for the use of the public, the greater part of the Meadow in question under the conditions which have been discussed and practically agreed to between the two Departments, viz., that the Office of Works will erect proper fencing to limit the admission of the public, that the arrangement shall in no way prejudice the rights of the Crown to deal in any manner it may deem fit with the land thus ceded or any part of it, but shall be considered one strictly at the pleasure of the Crown and terminable by it at any time; also that the Department of Works will undertake to keep in suitable condition all the grounds attached to Kew Palace, and will further cause to be kept in order and properly thinned the trees, shrubberies, and paths in the grounds attached to the Queen's Cottage in Kew Gardens.

I further concur in the proposal as shown by plan as to the fencing in Kew Meadow, prepared by your Department, with reference to the foregoing arrangement, as forwarded in the letter from your Department of the 4th instant.

Yours truly,
(Signed) BREADALBANE,
Lord Steward.

The Right Hon.
Herbert J. Gladstone, M.P.,
First Commissioner of Works, &c.

Notizblatt des Königlichen botanischen Gartens und Museums zu Berlin.—Berlin has paid Kew the compliment of establishing an organ on the same lines and for the same purposes as the *Kew Bulletin;* that is to say, for recording noteworthy events in the establishments which would otherwise attract little attention; for publishing the novelties in small collections that are constantly arriving, and for developing a more intimate connexion between the home and colonial botanical and horticultural institutions. The first number contains a list of the most noteworthy plants recently introduced into the Berlin garden; experiments in raising and cultivating plants, and consignments to the colonies; notes on plants cultivated in the colonies; diagnoses of new plants, and miscellaneous notes. The prompt publication of information of this kind can only result in benefit to similar establishments in other countries and the advancement of botanical science and enterprise in the world.

Botanical Magazine.—The number for February contains figures of several plants of unusual interest. *Musa Hillii*, a native of Queensland, was previously imperfectly known. Mr. F. M. Bailey, Colonial botanist, sent seed to Kew in 1889, and a plant raised from them flowered in the Palm House in December 1893, but did not set fruit. Quite recently, but too late for the *Magazine*, fruit has been produced. It is bright red, globose in shape, about an inch and a half in diameter, and altogether unlike an ordinary banana. *Aphærema spicata* is a monotypic herbaceous member of the *Samydaceæ*, and a native of Brazil. It was first collected by Mr. J. Weir, 1861–2, and recently re-discovered by Dr. Fritz Mueller. It was raised from seed sent from the Copenhagen Botanic Garden. *Richardia Pentlandii*, a native of Basutoland, is remarkable for the large size of its cordate leaves and the deep yellow of its spathes. It was drawn from a plant, one of several grown from tubers brought to Kew by Mr. E. E. Galpin in 1892. *Aloe brachystachys*, sent to Kew by Sir John Kirk from Zanzibar in 1884, is a new arborescent species allied to *A. abyssinica*, which flowered for the first time in January 1894. The remaining plant figured is *Cephalanthus natalensis*, a species having a wide range in South-eastern Africa, and interesting as being the only African member of a genus represented by several species in Eastern Asia and North and South America. It is a pretty, though not a showy shrub, and was raised at Kew from seed presented by Mr. W. J. Horn.

Mr. Scott-Elliot's Ruwenzori Expedition.—*Nature* for November 5, 1891, gave an account, rescued from an American periodical, of the botanical results, slender enough it is true, but not without interest, of the Emin Relief Expedition, as described by Major Jephson. This was based on a small collection brought by Lieutenant Stairs from "a high altitude on the slopes of Ruwenzori or the Mountains of the Moon."

In 1893 Mr. Scott-Elliot, an accomplished botanist and distinguished African traveller, submitted to the Government Grant Committee of the Royal Society a scheme for an extended plan of botanical exploration in Central Africa. On the advice of the Board for Botany, Mr. Scott-Elliot undertook the investigation of Ruwenzori, and through the kind aid of Sir John Kirk, such official facilities as were possible were obtained on his behalf.

A letter dated Ruwenzori, May 21, 1894, was published in *Nature* for October 4 of that year. It raised a high expectation that Mr. Scott-Elliot would succeed in thoroughly investigating the flora of this interesting region.

Mr. Scott-Elliot is now on his way home, and the following letter is the latest intelligence which has been received from this intrepid traveller.

Some account of Ruwenzori on which Mr. Scott-Elliot had spent four months is given by himself in *Nature* for January 17, 1895, in a letter dated August 2 of the preceding year.

Mandala, Shire Highlands,
6 December 1894.

DEAR SIR,

I THINK I should report to you as to my movements since leaving Ruwenzori. I was obliged to start south owing to my supply of cloth running short and the impossibility of feeding my men.

I thought it would be too foolhardy to attempt to cross Ruanda, of which I had very bad reports from everyone, so determined to pursue my original plan of trying to see if the Kagera river was navigable. I therefore crossed Mpororo and followed this river from the point where it turns eastward until I thought that I was on the latitude of Tanganika. I then went across Urundi towards the lake which I reached after great difficulty with the natives (my caravan consisted of 40 men of whom one was killed by the Warundi). I then came down Tanganika by Arab dhows to Abercorn, crossed the Stevenson Road and came down to Matope on the upper shore by steamer and boat. I was obliged to give up my original idea of visiting the Livingstone Mountains on account of blindness, the result of Tanganika fever and a slight attack of dysentery. It is only during the last few days that my eyes have recovered sufficiently to enable me to botanise, and I have been reduced to trusting to natives for specimens. My collection now consists of about 2,300 numbers of herbarium specimens. I also have a fair number of insects, a few bird skins, small mammals, amphibia, and fish in spirit (of which I could only carry a very small amount), geological specimens and photographs. I have also made a map of my route from Ruwenzori to Tanganika which is chiefly over as new ground as Ruwenzori itself.

I propose to stay here a fortnight and then return home as my health is not completely recovered and my expenses are becoming very heavy indeed.

I hope my collections will reach home in good condition; I am trying to keep them with me but have thought it best to send them to Chiroma at present as the rains are coming on and I wish to botanise on Milanje.

I am, &c.

The President, (Signed) G. F. SCOTT-ELLIOT.
Government Grant Committee,
Royal Society.

Malayan Plants.—Dr. G. King has sent another parcel of plants representing the novelties of the continuation of his *Materials for a Flora of the Malay Peninsula*. These are chiefly *Meliaceæ*, which are very numerous in the peninsula; but there are also many other novelties belonging to the neighbouring families. Altogether there are about 350 sheets of specimens.

Flora of Florida.—The first instalment of Mr. G. V. Nash's Florida herbarium, comprising some 700 species, has been purchased. The specimens are excellent, and were collected in the vicinity of Eustis in Lake County.

Castleton Gardens, Jamaica.—The *Bulletin* of the Botanical Department, Jamaica, for October—December, 1894, contains very interesting notes on the plants cultivated in the Botanic Gardens at Castleton. This serves both as a guide to the gardens and affords useful information on the plants themselves. A plan is added, showing where the plants may be found. These gardens were established about 30 years ago in a picturesque valley in the mountains between Kingston and Annotto Bay. They are 19 miles from Kingston, but, as Mr. Fawcett remarks, "the drive there and back more than compensates for the distance." The scenery along the banks of the Wag-water river is probably the most characteristic and beautiful of any in the island. The elevation is 580 feet, with an annual mean temperature of 76° Fah. The annual rainfall is about 110 inches.

The chief feature of the garden is undoubtedly its fine collection of palms. These thrive exceedingly well in the moist part of the locality. There are the Sugar-palm (*Arenga saccharifera*), Tucum-palm (*Astrocaryum vulgare*), Cohune-palm (*Attalea Cohune*), Jamaica Ippi-appi (*Carludovica gracilis*), Wax-palm (*Copernicia cerifera*), Æta-palm (*Mauritia flexuosa*), Ivory-palm (*Phytelephas microcarpa*), Jupati-palm (*Raphia tædigera*). Of flowering plants *Amherstia nobilis* has long been established; *Beaumontia grandiflora* forms large festoons across the garden paths, while others such as *Bignonia magnifica*, species of *Bauhinia*, *Colvillea racemosa*, *Dillenia indica*, *Mesua ferrea*, *Michelia Champaca*, *Napoleona imperialis*, *Spathodea campanulata*, *Victoria regia* are very luxuriant and attractive. The Mangosteen (*Garcinia Mangostana*) fruited for the first time in Jamaica at Castleton in 1886. With Economic plants the Castleton Gardens are well supplied. They serve as an excellent centre for the propagation and distribution of such plants on the north side of the island, and large quantities are also sent to the Hope Gardens and to Kingston.

The three best known rubber trees, viz., Para-rubber (*Hevea brasiliensis*), Central American rubber (*Castilloa elastica*), and Ceara rubber (*Manihot Glaziovii*) have been established for more than 12 years, and have borne crops of seeds. A very successful plot of Liberian coffee has been a prominent feature since 1880, and large quantities of seed are annually distributed in the island. Mr. Fawcett anticipates that the export of coffee from Jamaica ought soon to be doubled.

West African Mahogany.—An article on West African mahogany (*Khaya senegalensis*) was published in the *Kew Bulletin*, 1890, p. 168. A further article (*Kew Bulletin*, 1894, p. 8) showed that the timber of several other trees supplied the African mahogany now in commerce. Mr. James Irvine, of Liverpool, was good enough to furnish notes giving the following native names for different kinds of mahogany exported from West Africa: "Papáo," "Bako," "Dubin," "Kwabaha," "Chire-ahkama," and "Odum." Odum or Iroko (*Kew Bulletin*, 1891,) is *Chlorophora excelsa*, Benth. Of the botanical identity of the other timbers we have no authentic information.

The African mahogany trade was started as lately as 1886. Already it has assumed such proportions (12,000 tons annually) that it has seriously affected the important mahogany industries of British Honduras and other countries. African timber is even finding its way into the New World. The following note on this point has appeared in *Garden and Forest* for January 30, 1895, p. 50:—

"The *Southern Lumberman* says that mahogany logs from the west coast of Africa have got as far as Louisville, Kentucky, and adds that it is much cheaper than the mahogany from Central America and Cuba. From these mahogany forests in Africa it is said that twelve million feet of lumber have already been cut and exported, and they promise to yield an immense revenue to the British and French colonists who have seized upon the territory. The wood has a tinge of pink in contrast with the somewhat reddish colour of the American variety, and some of the squared logs which have been imported are two by three and a half feet in size. We may add that some of this African mahogany is the wood of *Khaya senegalensis*, a tree which belongs to the same family as the true mahogany, and is closely related to it. It is not so desirable a cabinet-wood as the Mexican or Cuban mahogany, but is more like the Central American wood. Occasionally there are logs richly figured, and these have been manufactured here into very attractive veneering."

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

Nos. 100, 101.] APRIL and MAY. [1895.

CCCCLIII.—SUGAR-CANE DISEASE IN BARBADOS.

The rind-disease in sugar-cane (*Trichosphæria Sacchari*, Massee) was described in the *Kew Bulletin*, 1893, p. 149. The root-disease (*Colletotrichum falcatum*, Went) was discussed in *Kew Bulletin*, 1893, p. 347. Subsequent investigation has shown that these are different forms of one and the same disease. The treatment of the fungoid and insect pests affecting sugar-cane in the West Indies was published in *Kew Bulletin*, 1894, p. 167. Since that time the subject of cane diseases has occupied a good deal of attention, but it can hardly be said that anything has actually been done to meet the danger which seriously threatens the sugar industry in the West Indies. The latest information to hand is contained in a Report of the Commission appointed by the Governor of Barbados (Sir James Shaw Hay, K.C.M.G.) to inquire into and report upon the best means of destroying the Borer or any other pest affecting the sugar-cane. The Borer here mentioned is the grub of a moth (*Chilo saccharalis*), figured in *Kew Bulletin*, 1892, p. 153; and fully described with remedial measures in *Kew Bulletin*, 1894, pp. 172–175.

From this Report the following extracts are taken :—

THE RIND FUNGUS.

In riding round the margin of a canefield, canes infected with the rind fungus are first noticed by dark red or brown marks, in one or two joints towards the middle or base of the cane. These marks are easily distinguished from sun-burn because of their diffused character, indistinct edges, and by its being evident that they are not mere surface stains, but that the tissues beneath are affected. This "Red patch" on the canes is first noticed in July, and from October onwards gradually becomes more and more abundant up to the time of the ripening of the canes. It is by no means found only in poor looking canes, but is often present in fine looking plants. This red patch having made its appearance, rapidly spreads upwards and downwards, the infected area darkens in appearance, and is evidently rotten. Little black specks make their appearance, breaking from the inside to the surface of the cane, being first seen in the sleeping roots near the joints, and then at the parts of the cane between the joints, finally the cane shrivels and dries up.

The result of this disease is that canes which if they had remained healthy would have given a large yield of rich juice, are found to be absolutely valueless, and so far from themselves yielding sugar, their presence amongst crushed canes actually leads to a marked deterioration of the juice and of the sugar manufactured therefrom, as well as to a diminution in the quantity of the sugar obtained.

This disease is present in probably every canefield in the island, and the total crop of 1894 is clearly found to be very seriously diminished by it. And your Commission have formed, after the most careful consideration, the very disquieting opinion that if it be left unchecked the cultivation of the sugar-cane will be rendered unprofitable, and therefore extinct in this island. With the present outlook as regards prices and production, it is evident that if sugar-cane cultivation is to remain the staple of the island, large crops must be maintained at a minimum cultivation cost, and this cannot possibly be accomplished in the presence of any serious amount of disease.

RIND FUNGUS AND MOTH BORER.

From the appearance it would seem that the rind disease in at all events a large number of cases started from the burrow of the Moth Borer. It would seem that in Barbados up to say December in each year the fungus makes an entrance into the cane at spots injured by the Moth Borer, which must therefore be looked upon as a very serious insect pest.

From January onwards, however, an increasing number of canes will be found attacked by rind fungus, and without any signs of Borer whatever. From a careful examination of such canes it would appear that the attack had started from the middle or base of the cane as the fungus is most mature there, first sending out the black specks (which are spores or seeds) in those portions. These cases of canes attacked by fungus alone are very serious, because they increase with the ripening of the cane, and in March and onwards become so numerous that they constitute, we think, a large majority of the diseased canes. These canes are frequently found red from end to end and rotten or dry and shrivelled up from end to end without any sign of Borer whatever. It would appear from Mr. Massee's very comprehensive and able paper that the fungus in such instances must have effected an entrance at the ragged bases of the old leaves which have been torn or broken off. The above facts show the fungus to be a pest which can by itself and without any previous insect injury attack the cane; consequently a pest to be dealt with in addition to any measures which might be adopted to exterminate the Moth Borer.

ROOT FUNGUS.

For the present we leave the subject of rind fungus to deal with that of "*root fungus*" so called; specimens of which have also been examined and reported upon by Mr. Massee, who determined it to be a fungus known as *Colletotrichum falcatum*, a species recently described by Dr. Went as injuring the canes at Java.

The characteristics of this disease, as far as we have examined it, are as follows:—

(1.) It was at first confined for the most part to the higher red soils of St. John, having only appeared in small patches in a very few other places but has since spread in spots all over the island.

(2.) The effect of this disease is that the canes appear to receive a check in their growth about June and July after planting; the plant dwindles down, fresh basal shoots are formed to supply the place of the dying ones, but notwithstanding this it is ultimately found that growth has been arrested and no cane formed; and if the plant be dug up the roots are nearly all dead; and those that are still living are dotted over by little red spots. The dead roots are also often covered by mildew.

(3.) Such canes yield practically no sugar, and the crop of a thoroughly diseased field is practically nothing.

(4.) There seems to be some resemblance between this disease and the Sereh of Java. In the latter disease we have the same retardation of growth, and shortness of joints, a great number of dead roots, an attempt to throw out new shoots from the stool to replace those above that are dead. In Sereh, as in the St. John's disease, there is a gradual dying away of the plant after the commencement of the rainy season.

The one characteristic (histological) of Sereh is the presence of a gelatinous substance, slime or gum, in the fibro-vascular bundles of the cane, giving the parts attacked a red colour.

It has been finally decided at Kew that *Colletotrichum falcatum*, Went, is simply one phase in the life history of *Trichosphæria Sacchari*, Mass., and that the phenomena above described are the effects of that particular phase of the disease.

SELECTED CANE PLANTS.

It is difficult to form a decided opinion with regard to the part played by carelessly selected cane plants in propagating rind fungus. The attack appears so late in the life of the cane that it is difficult to suppose that careless selection has been the direct cause of the presence of fungus spores. It is almost equally difficult to speak with regard to the propagation of Moth Borer. This insect, as well as the fungus, appears to be more prevalent in the low than in the high lands, and it may be that the better shelter from winds in the former districts enables it to settle more effectively and prevents dispersion. On the other hand, in recent years it often happens on every estate that a larger or smaller number of cane plants fail to germinate or die off almost immediately after germination.

At all events, in some cases this is due to diseased plants, and it seems exceedingly probable that the high number of supplies on some estates has been partly due to that cause. The disease is sometimes due to the Moth Borer and sometimes due to fungus. In this connexion an interesting experiment is recorded by a planter of this island, who planted 2900 healthy Keni Keni plants from a healthy field, and 2850 Keni Keni plants selected carefully by labourers from a diseased field, trying to get only healthy plants from this field. The result was 2850 germinated in the first case, and only 50 germinated in the second case. One estate in the island took 80,000 plants to supply 77,000 holes. These instances, in our opinion, show one of the effects of planting diseased canes, another effect being, according to Kew experiments, to produce the root form of the disease.

The careful selection of plants has been urged not only in Barbados, but in every cane-growing country where disease has led to careful investigation, and the practice of indiscriminate selection of plants has been universally condemned. There can be no doubt that while we have not sufficient evidence to warrant us in ascribing the October rind fungus to this source, it must yet be a very prolific source of all the diseases which occur in the early life of the young cane; it may possibly be the means whereby root fungus is spread, and is certainly a means of propagating the Moth Borer.

CHANGE OF VARIETIES OF SUGAR CANES.

Has the continual propagation of one variety led to degeneration? There is no evidence upon this point beyond the impression left by a comparison of the Bourbon with other and with seedling varieties. Analogy teaches us that direct propagation from seed is the one most likely to maintain a vigorous species, and that although by propagation from cuttings we may gradually modify a plant to develop richness in some one respect and to maintain some one quality, yet a gradual decrease of general vitality may result, and a want of adaptation to surrounding circumstances. The production of plants from seeds possesses advantages of maintaining vitality, of adaptability to surrounding conditions, and of lending itself to the production of new qualities.

General experience in other countries shows, on the one hand, that a change of varieties is an effectual way of combating plant diseases. Thus Mauritius is reported to find a constant change of great value, Queensland is said to have greatly mitigated the ravages of the rust by this method, and lastly, there is an ever-increasing store of evidence of the most reliable kind to show that there are several varieties of cane in Barbados (including some seedling canes) which possess a striking though not complete immunity to fungoid attack.

The following biological consideration leads to the same view, that where one variety of plant is cultivated to the practical exclusion of all others, that all the parasites of that plant enjoy the very best conditions for their continuous propagation and increase. Or to reduce this generality to our special case, that continuing to plant the Bourbon cane is to provide a continuous supply of material for the rind fungus to grow and increase upon. Change the variety, and the parasite exists with much greater difficulty or has to change its habits.

The fact that both the rind fungus and the root fungus are so much less liable to attack certain varieties of the cane other than Bourbon cannot fail to be a fact of immense value.

Your Commission after very careful inquiry not only found that certain varieties of canes strongly withstand both root and rind fungus, but the record also shows that at all events in some places these varieties are very profitable to cultivate, and your Commission most strenuously advocates that the cultivation of these varieties should be extended in every direction, cultivating in each district the variety which proves most fitted for it. During the last few years the diseases which attack the Bourbon sugar-cane have steadily increased in amount, and the history of like cases points to the belief that this increase will go on and not abate until some very serious measures are adopted; and amongst them we consider the cultivation of new varieties as one of the most promising. With the present prospect as regards price of sugar the whole industry can only exist by the strictest economy in cultivation and manufacture; and with any serious amount of disease, cultivation must cease to be profitable. Undoubtedly if the progress of the present disease in Barbados cannot be checked, the island is doomed to ruin. And all considerations point to the conclusion that the whole island must be ready to abandon if necessary the cultivation of the Bourbon variety. Your Commission recommends that every estate should be ready by having such an amount of cane varieties planted as will serve to supply, if occasion demands, a sufficiency of plants to plant the whole estate in those varieties.

SERIOUS CHARACTER OF THE ATTACKS OF THE MOTH BORER.

Moth Borers of one kind or other have been recognised as destroyers in every sugar-producing country; in India, Mauritius, Java, and other East Indian islands; in Queensland, Louisiana, and all over the West Indies. The Mauritius disease, which was investigated in 1848 by a Government Commission, was of this nature, and your Commission have come to the conclusion that *Diatræa Saccharalis* is by far the most serious *insect* pest in this island, and in the months of October to December by its injuries to the sugar-cane enables the spores to effect an entrance and attack canes in a manner which at that time of the year would not otherwise occur. Various observers who have written upon the subject have held the view that this insect was the parasite most to be feared.

Of all insect enemies of the sugar-cane the Moth Borer is certainly the most serious one in Barbados. It attacks all varieties of canes and hence is not only constantly exposing them to the attack of fungi or bacteria, but would in many cases carry the very spores into its burrows, besides which, the injury suffered by any cane by the actual attack at least leads to impoverished juice, if not to actual death of the plant. A glance at any of the literature of the cane diseases will convince any one of the importance which every cane-growing country has attached to checking the spread of this pest. And a very interesting compilation upon the subject was made by Mr. T. D. A. Cockerell, late of Jamaica. The remark of the Rev. L. Guilding has not to the present day been disproved that the Moth Borer is the most destructive and common insect enemy of the sugar-cane. As Mr. Cockerell remarks, "no one can doubt that in these days of severe competition, when sugar is by no means as profitable as formerly, a comparatively small gain or loss, much less than that enumerated by Mr. Van Patten, may make all the difference between success and failure." The same insect-specialists also say that the application of insecticides as manures to the soil is not applicable to the present case "as the life history of *Diatræa Saccharalis* is well known and there is no reason to suppose that at any stage it lives in the soil."

REMEDIES AND RECOMMENDATIONS.

1. That a strong central committee of planters and others who represent the interest of the Island as proprietors and attorneys, and who are favourable to remedial measures, be appointed to see that these measures are carried out.

2. That from this central committee the planters from each parish, together with some from the adjoining ones, compose a sub-committee for that parish; the duties of this sub-committee being to keep the parish under a thorough inspection and to see that all measures are continually and thoroughly carried out.

3. That all plants before planting be soaked in Queensland solution* or other solution which the Island Professor of Chemistry, with the approval of the central committee, certifies to be equally efficacious.

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* One pint of carbolic acid to 100 gallons of water.

4. That wherever deemed possible by the sub-committee the practice of spreading trash around young canes be given up; and that wherever it be resorted to only trash from a field which has been inspected by the sub-committee and declared healthy, or as healthy as possible, be employed.

5. The rotten canes on all fields diseased with rind fungus and "root fungus" should be burnt on the field, or crushed and burned as herein-before mentioned. In fields diseased with root fungus the stumps should be dug up, the mould shaken off, and be allowed to dry and be burned or buried.

6. That rotten canes on all fields be regularly burned during the crop. Juicy ones could be first crushed and the megass burned, the juice being boiled.

7. That the trash used as litter be taken from fields which are healthy or as healthy as can be got.

8. That each estate put such an area under the so-called hardy varieties of cane plants as will suffice to re-plant the whole of the estate in those varieties if necessary.

9. That when root fungus has made its appearance, rattooning for the present should be gradually given up.

10. That the canefields be periodically inspected, with a view to cutting out canes infected with Borer or fungus, which canes should be bagged upon the spot and taken away, crushed and burned.

11. Rotation of crops should be especially resorted to in the case of root fungus.

GEORGE C. PILE,
President of the Commission.

The following documents carry on the history of the subject:—

NOTE by Mr. MASSEE on the *Melanconium*-stage of *Trichosphœria Sacchari.*

Specimens of diseased sugar-cane were sent to Kew in 1878 from Porto Rico for investigation. These were submitted to the Rev. M. J. Berkeley, who gave the MS. name of *Darluca melaspora* to the fungus present on the canes. The fungus was afterwards very briefly described under Berkeley's name by Cooke in *Nuovo Giornale Bot.*, vol. x., p. 26 (1878), who incorrectly gave the locality as Australia instead of Porto Rico. Saccardo has added to the confusion by changing the name to *Coniothyrium melasporum*, and in quoting Cooke's diagnosis incorrectly in *Syll. Fung.*, vol. iii., No. 1799.

Finally, Prillieux and Delacroix, in their paper on sugar-cane diseases (*Bull. Soc. Mycol. de France*, tom. xi., p. 75, 1895), have fallen into the error of considering the Melanconium stage of *Trichosphœria Sacchari*, Mass., to be synonymous with *Coniothyrium melasporum* (Berk.) Sacc. Examination of Berkeley's type specimen shows that the fungus is a *Diplodia*.

GOVERNOR OF BARBADOS to COLONIAL OFFICE.

Government House, Barbados,
19th February 1895.

MY LORD MARQUESS,

WITH reference to your Lordship's Despatch, No. 131, of the 15th December last, respecting the action of the House of Assembly with regard to the Bill dealing with the sugar-cane diseases, I have the honour to state that having brought to its notice your Lordship's correspondence with the Governor of Trinidad, it was resolved not to proceed further with the proposal to obtain the services of an expert, and the joint committee of both branches of the Legislature to which my draft Bill had been referred, after due deliberation, with slight modifications adopted it. I anticipate that it will be considered by the House of Assembly at its next meeting, and enclose a copy for your Lordship's information.

2. I also transmit a copy of a report, rendered by Mr. Bovell at my request, on the fungus disease amongst the canes, which I regret to say appears to be still spreading, and in forwarding copies to the Legislature, I have once again invited serious attention thereto.

3. As being germane to the subject, I likewise attach a copy of the report of a commission nominated by me in January 1893 "to inquire into and report on the best means for destroying the Borer and other pests affecting the sugar-canes," which I have just received, and which has this day been laid on the table of the House. It is, I think, interesting to note that the conclusions arrived at are very similar to the recommendations of the Director of the Royal Gardens, Kew, which are in the main embodied in the draft Bill dealing with the question.

I have, &c.
(Signed) J. S. HAY.

The Most Hon.
The Marquess of Ripon, K.G.,
&c. &c. &c.

[Enclosure.]

REPORT on the SUGAR-CANE FUNGUS (*Trichosphæria Sacchari*, Mass.) at present existing in the ISLAND.

Although I knew of the existence of what is known as the root fungus, one of the forms of the polymorphic *Trichosphæria Sacchari*, Mass., and had obtained permission to plant a hardy variety of the sugar-cane in a badly affected field on Henley estate, in the parish of Saint John, so as to ascertain whether the hardier varieties would be less likely to suffer from the root fungus than the Bourbon cane, it was not until December 1891 that my attention was drawn to the rind fungus, another form of the same *Trichosphæria*, by Mr. Hutson, the manager of Sunbury estate, who asked me to tell him what was the matter with certain holes of canes in a field, some of which were dying, and from that time onwards the two forms of the fungus have spread rapidly until now, February 1895, there is hardly an estate which is not more or less affected.

2. In many instances so badly has the disease attacked the canes that instead of an acre giving from two to three hogsheads of sugar it will require many acres to give one hogshead.

3. Since my return to the colony I have not as yet, owing to press of other work, been able to visit the whole island, but in the parishes that I have been, viz., St. Philip, St. John, St. George, and portions of Christ Church, St. Thomas, St. Michael, and St. Andrew, I am decidedly of opinion that, taking the two forms together, there is more of the disease than there was at this time last year. Owing to the dry weather experienced during the earlier part of last year the stems of the

canes have been in a great measure protected by the leaf-sheaths up to a later period than is usually the case, consequently so many canes have not yet been killed by the rind fungus as there were at this time last year, but it is now greatly on the increase. On the other hand, there is very much more root disease apparent; this is, in my opinion, due in a great measure to the spores of the rind fungus being worked into the soil in the process of cultivating it, and to, in many instances, plants containing the fungus being used for replanting the estates. On some of the estates where I knew the tops of canes affected with rind fungus were used as plants last December year, the fields are now, as was to be expected, badly diseased. On the other hand, it is with much pleasure that I note on those estates where hardy varieties were planted, and, in some instances, the recommendations of the authorities at Kew carried out on fields badly affected last year and the year before, there is a marked improvement, and if all the planters were to do what has been found so successful on the estates to which I refer, I have not the slightest doubt but that in a few years the disease will have nearly, if not entirely, disappeared, but so long as there are planters who take plants from diseased canes, as some have done up to quite recently, so long will the disease continue to give trouble, and occasion considerable loss.

(Signed) JOHN R. BOVELL,
Superintendent.

The Bill was thrown out in the Legislative Council, March 26, by the casting vote of the President, Sir George Pile.

CCCCLIV.—RAFIA FROM WEST AFRICA.

In the *Kew Bulletin* for 1891, pp. 1–5, an account is given of West African bass fibre, prepared from the base of the leaves of the Bamboo palm (*Raphia vinifera*). Since that time African bass has become a recognised article of commerce. The price at first was about 42*l*. per ton; it rose to 56*l*. per ton, but latterly, in competition with similar fibre from the Palmyra palm, the Kitool, and the original bass produced in Brazil, known as Para and Bahia piassaba, it has been quoted at 20*l*. to 30*l*. per ton. Even at the latter price it supports a considerable industry in West Africa.

It appears probable that the Bamboo palm may be made available also for other uses. A strong, useful material known as Raphia or Rafia is shipped to this country from Madagascar. According to the Rev. Richard Baron, F.L.S. (*Kew Bulletin*, 1890, p. 211), it is obtained "from the young unopened leaves of the Raphia palm." *Raphia Ruffia*, Mart. *Hist. Nat. Palm*, iii., p. 217 (R. pedunculata, *Beauv.*) is confined to Madagascar. It is widely spread in the island, chiefly in valleys, up to an elevation of 4000 feet. It is also found abundantly along the coast The pinnate leaves are 20 to 30 feet in length, with numerous narrow leaflets, varying from 2½ to 5 feet long. Rafia is prepared by peeling off the cuticle (with some of the underlying fibro-vascular bundles) on one or both sides of the leaf. It is used locally for delicate plaited and woven fabrics, cloths, and hats, as well as for mats for covering floors and wrapping up goods. More recently it has been woven into superior matting, tastefully coloured, and used instead of tapestry for covering walls in London houses. The loose strips of Rafia are in demand in this country and elsewhere in place of Russian or Cuban bast as tie-bands by gardeners and nurserymen. For the latter purpose the strips are usually loosely plaited in hanks 1½ to 3 pounds in weight, made up into bales weighing 1½ to 5½ cwt. Each strip is a straw-coloured flat band about 4 feet long, and about ½ to ¾ inch wide, but capable of sub-division into fine threads.

Owing to the French expedition to Madagascar, Rafia has already shown an advance in price. It was sold recently at 55*s.* per cwt. Apart from this, however, there is apparently a steady demand and a good price for Rafia fibre.

Raphia Ruffia is closely allied to the Bamboo palm of tropical Africa. If the supply of Rafia from Madagascar were greatly reduced or cut off, it is very probable that within a short time it would be possible to obtain an almost identical article from West Africa. One of the first notices of a Rafia from this part of Africa is contained in the Report by Mr. C. F. Cross, F.I.C., on the Miscellaneous Fibres shown at the Colonial and Indian Exhibition 1886. Mr. Cross mentioned that this was so closely similar to Rafia "as to be applicable to precisely the same uses." The following particulars were given :—

"Grass (epidermal strips of *Raphia vinifera*). Exhibited by Mr. A. Sibthorpe in the Sierra Leone Section, with specimens of straw plait illustrating its more usual application by the natives. This specimen also proved itself on analysis to be worth the attention of paper makers. The following determinations were made :—

Moisture	9·8 per cent.
Ash	2·7 "
Cellulose	60·8 "
Ultimate fibres. Length	1·5 to 2·5 mm.

"It is needless to say that the raw material is particularly clean; in length of fibre, but more especially in yield of cellulose, it is superior to Esparto; it only remains, therefore, to determine the cost of production, and if within the limit, to introduce this raw material into European commerce. A further examination of this substance comparatively with Rafia, which still commands a high price amongst gardeners and nurserymen, showed that it was so closely similar as to be applicable to precisely the same uses, and such an application would, of course, take precedence of that above indicated. This fibrous material is well worthy of further attention.

"I have received from Messrs. Joynson satisfactory reports upon the papers made from the Rafia strips exhibited in the West African Section. They were treated by the (basic) sulphite process, and bleached to a good colour. The paper was reported to be of exceptional strength." [*Colonial and Indian Exhibition Reports*, pp. 379, 385.]

Small shipments of West African Rafia have already been made to this country. It was, however, badly prepared, and the results were not satisfactory. The strips were too short, and they reached their destination curled up so as to resemble very fine twine. It is necessary the strips should be very strong, of good length, and dried perfectly flat. Some of the best Madagascar Rafia is about 3½ to 4 ft. long. Very exceptionally it is 5 ft. long. This shows that the long leaflets in the middle of the frond are chiefly used and the shorter ones discarded. West African Rafia, to replace the Madagascar fibre, must be as long as possible, with a width of about ½ to ¾ in., but none less than ½ in.

If the Bamboo palm (*Raphia vinifera*) does not afford the best material for Rafia strips, it is possible some other species may do so. The West African Raphias so far known are as follows :—

Raphia vinifera, Beauv.—Bamboo palm. Abundant in West Africa, extending also to central tropical Africa, where it was found by Schweinfurth. Its distribution in Lagos is thus described by Sir Alfred Moloney (*Kew Bulletin*, 1891, p. 3) :—

"The 'Bamboo' palm (*Raphia vinifera*), is perhaps the commonest tree in the swamps and low lands which line the waterways of the colony. Dense thickets of these palms, traversed only by the palm-wine gatherer or the bamboo cutter, push their way into the lagoons, and extend over the flood grounds, and even to a distance of from 15 to 20 miles up the river-valleys into the interior. The area occupied by these *Raphia* forests it would be impossible to calculate, but it may be accepted, without doubt, that they extend throughout the length of the colony, and to a distance of at least 15 miles from the sea coast. Over this area, of about 5000 square miles, they form a considerable proportion of the vegetation, next only in numbers to the Oil palm (*Elæis guineensis*) and the Mangrove (*Rhizophora mucronata*). The fact that one can steam for miles, as I have frequently done, through uninterrupted *Raphia* groves, impresses one with the extent of the acreage which must be overrun by this graceful palm."

Raphia Hookeri, Mann and Wendl.—The *Ukot* of Old Calabar, where it is cultivated as a wine palm. The natives also manufacture cloth from the epidermis of the leaflets. On the Sherboro, in Sierra Leone, they make hammocks from it, as well as all sorts of basket work, mats, &c. This is one of the largest of the Raphias, the whole plant often attaining a height of 70 feet. The fronds are 40 feet long, with leaflets 4 to 5 feet long. If in other respects suitable, this should yield Rafia fibre as long as the best from Madagascar.

Raphia Gærtneri, M. and W.—Apparently confined to the Spanish Island of Fernando Po, in the Gulf of Guinea. It grows from the shore up to 500 feet above the level of the sea.

Raphia longiflora, M. and W.—The only locality given by Mann for this species is the island of Corisco, off the French Colony of Gaboon. This palm is 40 to 50 feet high, with fronds 33 feet long. The leaflets are 5 to 5½ feet long and 2 to 2½ in. wide. A figure, showing the natural habit, is given in *Trans. Linn. Soc.* xxiv., t. 39.

Raphia Welwitschi, Wendl.—A new species, collected by Dr. Welwitsch, in Angola. It grows in humid places on the rivers in the interior, and especially in the district of Galungo. The epidermis of the leaflets is used by the natives in the manufacture of cloths, &c. *R. textilis*, Welw. *Apont.*, 584, n. 2, yielding also textile filaments, is apparently a closely allied plant.

Epidermal strips, somewhat similar to Rafia, are available from many species of palms, notably the Cocoa-nut palm and the Palmyra palm. Specimens of these are in the Kew Museum. A variety of the Palmyra palm, known in various districts under the native names of *Morintshi, Kelingoos, Run, and Sibboo,* is well known to be abundant in West Tropical Africa. The epidermal strips from the segments of its fan-shaped leaves could, no doubt, be produced quite as long as those of the Madagascar Rafia.

While suggesting these other sources, it would be well, however, to confine attention at first to the Rafia palms, and especially in view of the fact that they form, as in the colony of Lagos, the prevailing vegetation over immense tracts of country.

The commercial position with regard to Rafia fibre is given below by Messrs. Ide and Christie. It will be noticed that particular attention is drawn to the fact that previous shipments of West African Rafia have failed because the strips were too short, and not presented in the flat broad condition characteristic of the Madagascar fibre. Too much reliance should not be placed on the exceptionally high price of Rafia at the present time. It would be safer to count only on the more normal price of the fibre, and this during the last few years has been about 30*l.* per ton:—

Messrs. IDE and CHRISTIE to ROYAL GARDENS, KEW.

72, Mark Lane, London, E.C.,
4th March 1895.

DEAR SIR,

YOURS of the 2nd instant, with sample of West African Rafia, to hand. This we have seen once or twice before, and sold with difficulty, being very inferior to the Madagascar. The former is very short and hairy, not long and broad like the latter, and would appear to be peeled from much smaller leaves.

We return your specimen along with a piece of the usual Madagascar, Whilst the latter is available the trade would only look at the West African at about half the price.

Yours faithfully,
(Signed) IDE and CHRISTIE.

The following account of the production of Rafia fibre has been published in the United States' *Consular Reports* for April 1894. It was prepared by Mr. Edw. Telfair Wetter, the United States Consul at Tamatave:—

Rafia Palm Fibre.

This fibre is the product of the Rafia palm (*Raphia Ruffia*), one of the most useful of the palm family. The tree is a native of Madagascar, growing profusely along its entire coast line near fresh water rivers, lagoons, and marshes, and the very best quality actually in the water. It is practically indigenous in the valleys all over the island. The natives cut the new leaves from the tree after they have obtained a height of some seven feet, and have just commenced to spread or open. Two new leaves always sprout out simultaneously from each tree and from the same sheath. In appearance and gracefulness, a fully opened Rafia palm leaf is midway between the leaf of the cocoanut palm and the plume of the ostrich.

After removal from the tree the leaves are separated, the leaf spears or feathers being cut away from the heavy leaf stalk or large centre rib and their tips cut off or not, according to the whim or needs of each worker. The inhabitants of the fishing villages are the main producers of Rafia fibre, because they are the main consumers of the by-products, making their finer fish nets from the small centre rib or spine that runs down the middle of each leaf spear. The entire native population use the leaf stalk or large centre rib in all their building and portage operations.

The first process of manufacture, in turning these leaf spears into the Rafia of commerce, consists in the removal, with a very small sharp knife, of the centre ribs of the spears. These ribs divide each spear in half. Each of these halves of leaf flesh are then stripped of their under covering, which, in the closed condition of the spear is, for the moment, the outside. This removal is readily accomplished by making a small cut across the leafy flesh above mentioned, about one inch from the base. The fibre, which exists in the shape of a vegetable film or covering on the under side of the leaf spear, is pressed up and loosened with the knife, and, being caught between the thumb and said point, is ripped off at one pull. The same thing is done with the other half of the spear flesh by merely reversing the same in the other hand and repeating the operation. Practice makes the process a simple, perfect, and rapid one, and a woman can readily strip, per day, what will yield some five pounds of Rafia. It must be understood that the men cut the Rafia leaves and carry them to their homes; the women do the rest. They, however, rarely strip more than what would yield two pounds of Rafia, because the curing of the fibre is partly accomplished the afternoon of the same day that it is stripped from the spear flesh.

The strips of whitish fibre thus secured, ranging from 2 to 4 feet and over in length, are spread out upon mats in the sun to dry in loose bunches. When partly dry, they are knotted into one pound bunches and spread, usually upon the roof edges of small sheds or outhouses, to finish curing, and are most carefully guarded against rain or dew. In three days of good sun drying the Rafia is ready for market

I regret to say that, owing to the cupidity of the natives and traders, much the larger portion is marketed after only one day's curing. The greener the fibre the heavier the weight; hence the temptation. . . . There is no particular time for preparing, cutting, or curing Rafia. The crop is a constant one, harvested to suit the wants or appetites of the natives, being received in the seaport towns at all times and seasons, weather permitting its transport, and shipped as shortly after receipt as possible. . . . It may be roughly stated that fully 50 per cent. of the young Rafia palm trees are annually destroyed in this way, and but for its remarkable hardiness, ready growth, and the ease with which it is propagated, this fact alone would mean its speedy and total extinction. Within four years, local Malagasy laws have been promulgated forbidding this terrible destruction. Yet it still exists, but in a surreptitious manner; or whenever they crave rum, cloth, or vazaha finery, for which Rafia fibre alone can be bartered.

. . . . Rafia is one of the most staple of Madagascan products, finding an even more ready market than rubber or caoutchouc. The price in Tamatave, or we might say free on board, as the cost of putting on board in quantity is a very nominal one, ranging from 5 to 9 cents for A 1 Rafia, while red Rafia usually brings about 2 cents per pound less than the A 1 white. . . . Practically, every one doing business in Madagascar buys Rafia either for speculation, in barter for goods, on commission, or as agents.

CCCCLV.—DIAGNOSES AFRICANÆ, V.

Oleaceæ.

Auctore J. G. Baker.

180. **Jasminum Smithii**, *Baker*, ramulis gracilibus glabris, foliis oppositis simplicibus ovatis vel oblongis obtusis subcoriaceis breviter petiolatis, floribus 1–3 terminalibus breviter pedicellatis, calycis tubo campanulato glabro, dentibus 6 subulatis tubo paulo longioribus, corollæ tubo cylindrico, lobis 10 lanceolatis tubo duplo brevioribus.

Habitat.—Mount Kilimanjaro, *Lieut. C. S. Smith.*

Folia 12–18 lin. longa. *Calycis* tubus 2 lin. longus. *Corollæ* tubus 12–13 lin. longus.

181. **Jasminum microphyllum**, *Baker;* erectum vel sarmentosum, ramulis dense pubescentibus, foliis oppositis simplicibus ovatis firmulis acutis dorso pubescentibus, floribus 1–3-nis terminalibus, calycis tubo campanulato dentibus lanceolatis tubo æquilongis, corollæ albæ tubo cylindrico, lobis 8–10 lanceolatis tubo duplo brevioribus.

Habitat.—Angola, province of Huilla, alt. 3800–5500 feet, *Welwitsch*, 932.

Folia 9–12 lin. longa. *Calyx* 2 lin. longus. *Corollæ* tubus 9 lin. longus.

182. **Jasminum obtusifolium**, *Baker;* ramulis pubescentibus, foliis simplicibus oppositis oblongis obtusis brevissime petiolatis dorso subtiliter pubescentibus, cymis paucifloris terminalibus pedicellis brevibus, calycis tubo campanulato dentibus lanceolatis tubo æquilongis, corollæ tubo cylindrico, lobis 7–8 lanceolatis tubo duplo brevioribus.

Habitat.—Banks of the Niger at Yomba and Kawgaw, *Barter.*

Folia 12–18 lin. longa. *Calyx* 2 lin. longus. *Corollæ* tubus 12–15 lin. longus.

183. **Jasminum brevipes**, *Baker;* sarmentosum, ramulis gracilibus glabris, foliis oppositis simplicibus oblongis acutis vel obtusis subcoriaceis glabris breviter petiolatis, cymis paucifloris terminalibus, pedicellis brevissimis, calycis tubo campanulato dentibus linearibus tubo paulo brevioribus, corollæ albæ tubo cylindrico, lobis 6 lanceolatis tubo duplo brevioribus.

Habitat.—Angola, province of Golungo Alto, alt. 1000–2400 feet, *Welwitsch*, 926.

Folia 2–3 poll. longa. *Calyx* 2 lin. longus. *Corollæ* tubus pollicaris.

184. **Jasminum brachyscyphum**, *Baker;* ramulis glabris, foliis simplicibus oppositis ovatis vel acuminatis glabris breviter petiolatis, cymis paucifloris terminalibus, pedicellis brevibus glabris, calycis tubo campanulato dentibus subulatis tubo duplo brevioribus, corollæ tubo cylindrico, lobis 5–6 oblongo-lanceolatis tubo brevioribus.

Habitat.—Shiré Highlands, Zambesi-land, *Buchanan.*

Folia 1–2 poll. longa. *Calyx* 3 lin. longus. *Corollæ* tubus 9 lin. longus; lobi 6 lin. longi.

185. **Jasminum Kirkii,** *Baker;* ramulis gracilibus dense pubescentibus, foliis oppositis simplicibus oblongis brevissime petiolatis dorso subtiliter pubescentibus, cymis terminalibus 1–2-floris, pedicellis brevissimis, calycis tubo campanulato dentibus lanceolatis tubo æquilongis, corollæ tubo cylindrico, lobis 6–7 lanceolatis tubo brevioribus.

Habitat.—Zambesi-land at Shamba and between Lupata and Tette, *Sir John Kirk.*

Folia 1–1½ poll. longa. *Calyx* 2 lin. longus. *Corollæ* tubus 9 lin. longus; lobi semipollicares.

186. **Jasminum stenodon,** *Baker;* ramulis gracilibus glabris, foliis oppositis simplicibus ovatis obtusis glabris breviter petiolatis basi late rotundatis, cymis terminalibus 3–4-floris, floribus distincte pedicellatis, calycis tubo campanulato dentibus subulatis tubo æquilongis, corollæ albæ tubo cylindrico, lobis 9–10 lanceolatis tubo paulo brevioribus.

Habitat.—Angola, *Monteiro.*

Folia 1½–2 poll. longa. *Calyx* 3 lin. longus. *Corollæ* tubus pollicaris.

187. **Jasminum obovatum,** *Baker;* late sarmentosum ramulis dense pubescentibus, foliis oppositis simplicibus superioribus obovatis cuspidatis inferioribus ovatis brevissime petiolatis, cymis paucifloris terminalibus et axillaribus, pedicellis productis, calycis dense pubescentis dentibus tubo æquilongis, corollæ tubo elongato gracili, lobis 6–7 linearibus tubo brevioribus.

Habitat.—Angola, province of Pungo Andongo, alt. 2400–3800 feet, *Welwitsch,* 928.

Folia 2–3 poll. longa. *Calyx* 2 lin. longus. *Corollæ* tubus pollicaris et ultra; lobi 9 lin. longi.

188. **Jasminum Welwitschii,** *Baker;* late sarmentosum, ramulis pubescentibus, foliis oppositis simplicibus ovatis vel oblongis dorso pubescentibus superioribus acutis basi rotundatis inferioribus obtusis subcordatis brevissime petiolatis, cymis paucifloris terminalibus, pedicellis brevibus, calycis tubo campanulato dentibus lanceolatis tubo multo brevioribus, corollæ albæ tubo cylindrico, lobis 5–6 tubo distincte brevioribus.

Habitat.—Angola, province of Pungo Andongo, alt. 2400–3800 feet, *Welwitsch,* 927.

Folia 1–2 poll. longa. *Calyx* 2 lin. longus. *Corollæ* tubus 8–9 lin. longus.

189. **Jasminum longpipes,** *Baker;* late sarmentosum, ramulis gracillimis pubescentibus, foliis simplicibus oppositis vel inferioribus alternis oblongis acutis firmulis dorso leviter pubescentibus, petiolo brevi piloso, cymis paucifloris terminalibus vel axillaribus, pedicellis gracillimis elongatis, calycis tubo subcylindrico, dentibus linearibus tubo brevioribus, corollæ tubo cylindrico lobis 9–10 lanceolatis tubo distincte brevioribus.

Habitat.—Angolo, province of Golungo Alto, alt. 1000–2400 feet, *Welwitsch,* 925.

Folia 1½–3 poll. longa. *Calyx* 4 lin. longus. *Corollæ* tubus 9 lin. longus; lobi 6 lin. longi.

190. **Jasminum angolense,** *Welw. herb.; Baker;* erectum, fruticosum, ramulis glabris, foliis oppositis simplicibus firmis parvis orbicularibus vel ovatis obtusis breviter petiolatis, cymis terminalibus 4–8-floris, pedicellis brevibus, calycis tubo campanulato dentibus subulatis tubo longioribus, corollæ extus purpureæ intus albidæ tubo cylindrico, lobis 9–10 lanceolatis tubo æquilongis.

Habitat.—Angola, province of Loanda, *Welwitsch*, 924.

Folia 9–12 lin. longa. *Calyx* 3–4 lin. longus. *Corollæ* tubus pollicaris.

191. **Jasminum oleæcarpum,** *Baker;* ramulis glabris, foliis oppositis simplicibus ovatis acutis membranaceis glabris breviter petiolatis, cymis paucifloris terminalibus, pedicellis brevibus, calycis tubo campanulato dentibus subulatis tubo longioribus, corollæ tubo cylindrico, lobis 8–9 lanceolatis tubo æquilongis.

Habitat.—Banks of the Rovuma river and on the Zambesi at Senna and Tette, *Sir John Kirk.*

Folia 12–18 lin. longa. *Calyx* 3 lin. longus. *Corollæ* tubus 9 lin. longus.

192. **Jasminum Walleri,** *Baker;* ramulis gracilibus subtiliter pubescentibus, foliis oppositis simplicibus oblongis acutis membranaceis brevissime petiolatis dorso pubescentibus, cymis paucifloris terminalibus et axillaribus, pedicellis brevibus, calycis tubo campanulato, dentibus subulatis tubo duplo longioribus, corollæ tubo cylindrico, lobis 7–8 linearibus tubo æquilongis.

Habitat.—Manganja hills, *Rev. H. Waller.* On the Zambesi at Tette and Magomero Mission Station, *Sir John Kirk.*

Folia 1–3 poll. longa. *Calyx* 3 lin. longus. *Corollæ* tubus 9 lin. longus.

193. **Jasminum ternifolium,** *Baker;* ramulis leviter pubescentibus, foliis ternis simplicibus oblongis vel ovatis acutis glabris subcoriaceis distincte petiolatis, cymis densifloris compositis terminalibus, pedicellis brevissimis pubescentibus, calycis parvi dentibus ovatis tubo brevioribus.

Habitat.—Bongo land, *Dr. Schweinfurth.*

Folia 1½–2 poll. longa, petiolo 4–6 lin. longo. *Calyx* 1½ lin. longus. *Corolla* ignota.

194. **Schrebera Buchanani.** *Baker;* arbor erecta, ramulis gracilibus pubescntibus, foliis oppositis simplicibus oblongis obtusis subcoriaceis facie glabris dorso praesertim ad costam pubescentibus, floribus ignotis, fructu pyriformi, valvis lignosis, seminibus ovoideis ala lata chartacea.

Habitat.—Shiré Highlands, *Buchanan.* Native name *Makangunola.*

Folia 1–2 poll. longa. *Capsula* 15–18 lin. longa, 1 poll. diam. *Semina* pollicaria.

LOGANIACEÆ.

Auctore J. G. Baker.

195. **Mostuea Walleri,** *Baker*; fruticosa, ramulis dense pubescentibus, foliis oblongis obtusis vel subacutis brevissime petiolatis basi cuneatis dorso ad venas hispidis, stipulis ovatis acutis parvis, cymis 2–3-floris plerisque terminalibus, pedicellis hispidis, calycis hispidi dentibus lanceolatis tubo longioribus, corollæ albæ tubo late infundibulari, lobis ovatis tubo æquilongis.

Habitat.—Zambesi-land, on the top of Moramballa, alt. 3000 feet, *Rev. H. Waller.*

Folia 9–12 lin. longa. *Calyx* 2 lin. longus. *Corolla* 4 lin. longa. *Fructus* ignotus.

196. **Mostuea fuchsiæfolia,** *Baker*; fruticosa, ramulis pubescentibus, foliis oblongis obtusis membranaceis brevissime petiolatis basi cuneatis dorso tenuiter pubescentibus, stipulis deltoideis, cymis axillaribus paucifloris, bracteis minutis, pedicellis calyce longioribus, calycis tubo brevissimo, dentibus acutis tubo longioribus, corollæ albæ lobis ovatis tubo duplo brevioribus, capsulæ lobis orbicularibus divaricatis.

Habitat.—Angola, *Welwitsch,* 4759. Ambriz and Quiballa, *Monteiro.*

Folia 1–2 poll. longa. *Calyx* 1 lin. longus. *Corolla* 6 lin. longa.

197. **Mostuea orientalis,** *Baker;* fruticosa, ramulis brunneis, foliis ovato-oblongis vel oblongis obtusis minute mucronatis membranaceis glabris brevissime petiolatis, stipulis ovatis obtusis, cymis multis axillaribus paucifloris, bracteis minutis, calycis tubo brevissimo dentibus ovatis acutis tubo longioribus, corollæ tubo late infundibulari, dentibus ovatis tubo æquilongis.

Habitat.—Mombasa, East Africa, *Rev T. Wakefield.*

Folia 1–2½ poll. longa. *Calyx* 1 lin. longus. *Corolla* 4 lin. longa. *Capsula* ignota.

198. **Strychnos zizyphoides,** *Baker;* sarmentosa, cirrhosa, ramulis glabris, cirrhis simplicibus gracilibus, foliis obovatis subacutis coriaceis glabris supra basin triplinerviis, cymis multifloris compositis axillaribus, pedicellis brevibus, calycis minuti lobis latis obtusis, flore ante anthesin globoso, stylo brevissimo, fructu parvo globoso monospermo.

Habitat.—Gold Coast, *Sir R. Burton* and *Capt. Cameron.*

Folia 1–1½ poll. lata. *Fructus* 4 lin. diam.

199. **Strychnos subscandens,** *Baker;* sarmentosa, cirrhosa, ramulis glabris, foliis oblongis acutis glabris brevissime petiolatis basi rotundatis obscure triplinerviis, cymis axillaribus brevissime pedunculatis, calycis minuti lobis latis obtusis, fructu parvo globoso monospermo.

Habitat.—Angola, province of Loanda, *Welwitsch,* 6018.

Folia 2–3 poll. longa. *Fructus* 4 lin. diam.

200. **Strychnos Vogelii,** *Baker;* sarmentosa, cirrhosa, ramulis glabris, foliis oblongis acutis vel subacutis subcoriaceis glabris e basi ad

medium triplinerviis, cymis axillaribus brevissime pedunculatis, calycis minuti lobis suborbicularibus, fructu magno pomiformi glauco.

Habitat.—Attah on the Quorra, *Vogel.*

Folia 3–4 poll. longa.

201. **Strychnos lucens,** *Baker;* sarmentosa, cirrhosa, ramulis glabris, cirrhis furcatis, foliis oblongis ad apicem obtusum attenuatis brevissime petiolatis obscure triplinerviis coriaceis utrinque nitidis glabris, cymis axillaribus paucifloris breviter pedunculatis, calycis minuti lobis latis obtusis, fructu parvo globoso monospermo.

Habitat.—Angola, *Welwitsch,* 6015.

Folia 1½–2 poll. *Corolla* ignota.

202. **Strychnos nigritana,** *Baker;* sarmentosa, cirrhosa, ramulis gracilibus glabris, foliis oblongis acutis coriaceis nitidis glabris breviter petiolatis e basi ad medium triplinerviis, cymis paucifloris axillaribus breviter pedunculatis, pedicellis brevibus glabris, calycis tubo brevi lobis ovatis obtusis valde imbricatis, corollæ tubo fauce piloso lobis ovatis tubo brevioribus, stylo elongato, fructu ignoto.

Habitat.—Nupe, Eppah and Lagos Island, *Barter.*

Folia 3–4 poll. longa. *Calyx* 2 lin. longus. *Corollæ* tubus 4 lin. longus.

203. **Strychnos loandensis,** *Baker;* sarmentosa, cirrhosa, ramulis glabris, foliis oblongis acutis glabris brevissime petiolatus obscure triplinerviis, cymis paucifloris axillaribus sessilibus, pedicellis brevibus, calycis lobis ovatis obtusis, corollæ tubo brevissimo, lobis ovatis obtusis, fructu ignoto.

Habitat.—Angola, province of Loanda, *Welwitsch,* 6016.

Folia 10–12 lin. longa. *Calyx* 1 lin. longus.

204. **Strychnos Moloneyi,** *Baker;* erecta, ecirrhosa, ramulis glabris, foliis oblongis acutis rigide coriaceis glabris breviter petiolatis e basi triplinerviis, cymis pluribus axillaribus breviter pedunculatis, calycis lobis brevibus ovatis obtusis, fructu parvo globoso monospermo.

Habitat.—Onitsha, *Barter.* Accra, *Sir A. Moloney.* Sierra Leone, *Scott Elliot,* 5431.

Folia 3–4 poll. longa. *Fructus* 4–6 lin. diam.

205. **Strychnos sennensis,** *Baker;* fruticosa, erecta, ecirrhosa, ramulis tetragonis glabris, foliis oblongis acutis subcoriaceis glabris subsessilibus e basi triplinerviis, cymis multifloris axillaribus breviter pedunculatis, calycis minuti lobis ovatis obtusis, fructu ignoto.

Habitat.—Valley of the Zambesi, opposite Senna, *Sir John Kirk.*

Folia 2–3 poll. longa.

206. **Strychnos microcarpa,** *Baker;* fruticosa, erecta, ecirrhosa, ramulis glabris, foliis oblongis acutis subcoriaceis glabris brevissime petiolatis obscure triplinerviis, cymis paucifloris axillaribus breviter pedunculatis, calycis tubo brevi lobis latis ovatis obtusis, fructu parvo globoso monospermo.

Habitat.—Angola, province of Loanda, *Welwitsch*, 4765.

Folia 1½–2 poll. longa. *Corolla* ignota. *Fructus* 4–6 lin. diam.

207. **Strychnos chrysocarpa**, *Baker;* fruticosa, erecta, ecirrhosa, ramulis glabris, foliis oblongis acutis rigide coriaceis glabris brevissime petiolatis e basi triplinerviis, cymis axillaribus et terminalibus brevissime pedunculatis, calycis tubo brevissimo, lobis latis obtusis, fructu magno aurantiaco polyspermo.

Habitat.—Gold Coast, *Sir R. Burton* and *Captain Cameron.* Sierra Leone, *Dr. Halcro Johnston.*

Folia 2–3 poll. longa. *Fructus* 1½–2 poll. diam.

208. **Strychnos Wakefieldi**, *Baker;* fruticosa, erecta, ecirrhosa, ramulis glabris, foliis obovatis obtusis rigide coriaceis glabris basi cuneatis supra basin triplinerviis brevissime petiolatis, cymis paucifloris lateralibus, pedunculis pedicellisque brevissimis, calycis tubo brevissimo lobis suborbicularibus, stylo brevi, fructu ignoto.

Habitat.—Mombasa, *Rev. T. Wakefield.*

Folia 1–1½ poll. longa. *Calyx* ¾ lin. longus. *Corolla* ignota.

209. **Strychnos triclisioides**, *Baker;* erecta, ecirrhosa, ramulis pallidis pubescentibus, foliis brevissime petiolatis obovato-oblongis obtusis rigide coriaceis e basi triplinerviis dorso pubescentibus, cymis axillaribus paucifloris breviter pedunculatis, calyce campanulato lobis orbicularibus, corollæ tubo cylindrico lobis ovatis, stylo elongato, fructu globoso polyspermo magnitudine mediocri.

Habitat.—Banks of the Niger at Nupe, *Barter.* Niger confluence at Lukugu, *J. T. Dalton.*

Folia 2–3 poll. longa. *Calyx* ¾ lin. longus. *Corolla* 3 lin. longa.

210. **Strychnos Burtoni**, *Baker;* erecta, ecirrhosa, ramulis pubescentibus, foliis obovatis obtusis brevissime petiolatis glabris triplinerviis, cymis multifloris axillaribus sessilibus vel subsessilibus, calycis tubo brevissimo lobis suborbicularibus, fructu globoso magno polyspermo pulpo eduli, seminibus magnis orbicularibus compressis.

Habitat.—Zanzuebar, *Sir R. Burton, Sir John Kirk.* Shiré Valley and at Shupanga and Kongone, *Sir J. Kirk.* Native names *Intheme* and *Intemo.*

Folia 3–4 poll. longa. *Calyx* ¾ lin. longus. *Fructus* 2½–3 poll. diam.

211. **Strychnos cocculoides**, *Baker;* arbor parva erecta ecirrhosa, ramulis pubescentibus, foliis suborbicularibus vel oblongis obtusis brevissime petiolatis dorso pilosis, cymis lateralibus, calycis pubescentis lobis ovatis acutis, fructu parvo globoso.

Habitat.—Angola, province of Huilla, *Welwitsch*, 4779. Native name *Maboce dolce.*

Folia 2–3 poll. longa. *Fructus* 3 lin. diam.

212. **Strychnos xerophila**, *Baker;* erecta, ecirrhosa, ramulis pallidis pubescentibus, foliis ovatis vel oblongis obtusis vel emarginatis coriaceis

5-nerviis dorso pubescentibus, cymis axillaribus paucifloris sessilibus pedicellis brevissimis, calycis lobis orbicularibus, corollæ tubo cylindrico, lobis oblongis tubo duplo brevioribus, fructu magno globoso polyspermo pulpa edula.

Habitat.—Madi, *Col. J. A. Grant.* Djur-land, *Schweinfurth*, 1719.

Folia 3–4 poll. longa. *Calyx* 1½ lin. longus. *Corolla* 4 lin. longa. *Fructus* 3–4 poll. diam.

213. **Anthocleista parviflora**, *Baker ;* arborea, ramulis crassis lignosis spinosis, foliis obovato-oblongis brevissime petiolatis basi dilatatis, cymis multifloris valde compositis, calycis lobis exterioribus orbicularibus, corolla calyce 3–4-plo longiore lobis circiter 12.

Habitat.—Banks of the Bagroo river, *Mann.*

Folia superiora pedalia, 4–5 poll. lata. *Cymæ* pedales. *Calyx* 3 lin. longus. *Antheræ* 2 lin. longæ.

214. **Anthocleista Kalbreyeri**, *Baker ;* arborea, inermis, foliis obovato-oblongis brevissime petiolatis, cymis compositis foliis multo brevioribus, calycis lobis orbicularibus, corollæ tubo calyce vix longiore lobis 16 oblongis tubo longioribus, filamentorum tubo brevissimo antheris linearibus.

Habitat.—Banks of the Bagroo river, *Kalbreyer.*

Folia ramorum bipedalia, 5–6 poll. lata. *Calyx* 3 lin. longus. *Corollæ* lobi semipollicares. *Antheræ* 3 lin. longæ.

215. **Anthocleista zambesiaca**, *Baker ;* arborea, ramulis inermibus, foliis obovato-oblongis brevissime petiolatis, cymis compositis foliis brevioribus, calycis lobis exterioribus orbicularibus, corollæ tubo calyce multo longiore, lobis circiter 12 lineari oblongis tubo brevioribus, filamentorum tubo brevissimo antheris oblongis.

Habitat.—Shiré Highlands, *Buchanan.*

Folia superiora 6–9 poll. longa. 3–4 poll. lata, inferiora sesquipedalia. *Calyx* 3 lin. longus. *Corollæ* tubus 15 lin. longus, lobi 9 lin. longi.

216. **Anthocleista laxiflora**, *Baker ;* fruticosa, sarmentosa, ramulis teretibus inermibus, foliis oblongis acutis brevissime petiolatis basi cuneatis, cymis brevibus ramis inferioribus foliis reductis bracteatis, calycis lobis exterioribus ovatis, fructu globoso.

Habitat.—Banks of the Kingui river, 1° N. lat. *Mann.*

Folia 5–6 poll. longa, 2 poll. lata. *Calyx* 9 lin. longus. *Corolla* ignota. *Fructus* 9 lin. diam.

CCCCLVI.—EXPERIMENTAL CULTIVATION AT PORT DARWIN.

The northern territory of South Australia, as is well known, is within the Tropics, and the climate is essentially tropical. It extends from 19° to 23° S. lat., and the more inland parts include portions of the

extremely arid deserts of Central Australia. The latitude corresponds with that of Madagascar and the southern parts of Brazil, but the seasons are greatly influenced by the neighbourhood of the interior deserts. The rainfall, as may be expected, is very variable. During the year 1893 the rainfall at Port Darwin, representing the coast region, was 62·5 inches, at Burrundie 49·4 inches, while at Powell's Creek, in the interior at about 22° S. lat., it was only 12·6 inches. In the interior the chief industries are pastoral and mining, but along the coast agricultural industries are being steadily pursued. The following report by the Curator of the Botanic Garden and Experimental Nursery at Port Darwin has recently been published. It affords evidence, as pointed out by the president, that "the soil and climate of the Northern Territory are well suited for the cultivation of valuable tropical and sub-tropical products":—

"SIR, "Palmerston, March 1st, 1894.

"I HAVE the honour to respectfully hand you my report on the progress of the more important experimental plots in the Botanical Garden and Experimental Nursery during the past year.

"*Rice.*—Last season the different varieties made excellent growth, but were eventually nearly completely destroyed by horses breaking into the garden at night. Now, however, that a small sum has been allowed for a new fence the depredations will, I am glad to think, no longer occur. The same block has again been planted this season, and looks extremely well.

"*Sugar-cane.*—The different varieties made very satisfactory growth last season, some in particular showing splendid canes. The second 'ratoons' now are looking as well as can be wished.

"*Cocoa-nuts* continue to progress, and the older they get the brighter the outlook. Several trees in the avenue are now either fruiting or showing a flower spike, and the fruit that has already matured on the trees first planted in the garden has been exceptionally large and heavy. The young trees planted out in the reclaimed mangrove swamp last year suffered severely from the attacks of the hermit crabs, and had to be protected by small sheets of tin round their base. They are now gradually recovering.

"*African Oil-palms.*—These continue the satisfactory progress previously reported. Over 300 seeds were obtained from the two older trees during the year, and several hundred more are again available.

"*Betel-nut palms* have made very good growth, and I expect them shortly to fruit.

"*Ginger.*—Splendid tubers were produced last season, and I have increased the area of the block under cultivation. The plants now are just showing above the ground. Two varieties are cultivated.

"*Starch-producing plants.*—Arrowroot and Cassava.—So satisfactory has been the growth of both these starch-producing plants last season that I have increased the area of the block under cultivation. The plants are now looking splendid. *Tous le mois* occupies a small block and has always done well. This is the plant yielding the starch produced in Queensland, but the product does not realise quite as high a price as that obtained from the real arrowroot, and I note in a recent official publication that endeavours are being made to replace its cultivation by that of arrowroot. *Tacca pinnatifida*—the plant yielding

South Sea Island arrowroot—is indigenous to the territory, and occurs spontaneously in the garden. Plants of it were distributed by the Royal Gardens, Kew, during the year to different Crown colonies as a plant desirable for introduction.

"*Oil plants.*—Sesamum, two varieties, as usual made satisfactory growth last season and is again doing as well. Peanuts.—An increased area has been planted this season, and I have never noticed finer growth. Two varieties are cultivated. Among other oil plants represented in the garden may be mentioned jatropha, behn, castor, chufa, croton.

"*Fibre plants.*—Sisal hemp.—Our plants have made satisfactory growth and already produce suckers. Owing to the representations of intending planters the Government undertook during the past year to import a quantity of plants for sale, and these arrived on the 18th of January this year. Six thousand plants had been ordered from Florida, but owing, I consider, to having been packed while in a too sappy condition, only 5,300 were alive on arrival, and these in a very weak condition, the white heart leaf and root stock alone remaining. The plants were at once put out in nurseries, and, I am glad to say, made a remarkable recovery, very few indeed being lost. Five thousand plants were sold, but, on account of their weak state on arrival, were allowed to remain in the nurseries until the next wet season. The duration of the plant from observations made in Yucatan is supposed to be 14 years, that is, from planting until the flower spike is produced, when the plant dies; but recent developments in the Bahamas seem to show that there, at least, the plant flowers in seven years and dies, and this is considerably modifying the brilliant estimates made. Pita, or pineapple fibre.—In an official bulletin issued by the Royal Gardens, Kew, it is recorded that a sample of pineapple fibre from the Straits Settlements was recently submitted to a manufacturer, and valued by him at 30*l.* a ton, with the statement that he alone was prepared to take, say, a thousand tons a year. Sunn hemp, a plant largely cultivated in India, is represented by a small block, though, as a matter of fact, it is indigenous to the Territory, and has been noticed by the late curator of the garden occurring with rice on the Daly River. Another Indian fibre, the jute, represented in our collection, is also indigenous to the Territory. The value of the raw fibre of this plant annually imported into England is stated to be over 4,000,000*l.* sterling. Ramie fibre.—A fresh block has been planted with roots of this plant, and magnificent growth has been made. Bowstring hemps.—Three species are represented in the garden, but only two (*Sansevieria zeylanica* and *S. cylindrica*) grow large enough for fibre purposes. The plants have been proved well adapted to the climate, and last year a successful experiment was made in propagating them from leaf cuttings, one leaf giving perhaps half a dozen plants, so that a stock can be soon worked up when required. The fibre produced is stated to be excellent, and worth 20*l.* to 30*l.* a ton. Among other kinds growing may be mentioned the following, proved thoroughly suited to the place, viz., Manila hemp, of which a small block has been planted out; 50,000 tons of this fibre are annually exported from the Philippine Islands; Deccan hemp, Abroma, Mauritius hemp.

Citronella grass (yielding essential oil).—The plants put out to cover a large vacant block of ground on the slope on the hill look a picture of luxuriance without having received any attention whatever, and so strong is the growth that not a weed is to be seen below the lines.

"*Cinnamon.*—Young and old continue to make the same satisfactory progress.

"*Vanilla.*—Our plants were cut up for propagation and the resulting young plants put out in a shade-house, where they are making good progress. Two kinds are in our collection.

"*Nutmegs.*—This plant was re-introduced, and I am sorry to say, again lost. I have, however, made arrangements to obtain some more for further trial, as I cannot but think that it should do well in certain situations, and the fact that an indigenous species thrives about Palmerston also encourages me to persevere. I propose planting a quantity of seed of the native species, and to try and graft the introduced plant on the stocks thus obtained.

"*Sorghums and Millets.*—Five varieties of the former and three of the latter are represented in small blocks, and have done very well, the broom corn, used in the manufacture of American brooms, being especially good.

"*India-rubbers.*—Three kinds have been grown for some time and a fourth, *Ficus elastica*, was introduced during the year. *Cryptostegia grandiflora* and *Manihot Glaziovii* (Ceara rubber) freely produced seed in the garden. Of the latter kind a quantity of plants were raised and will be planted out in vacant ground.

"*Grams* are, as usual, represented in small plots, and have again done well.

"*Dhal* looks magnificent, and cannot be too highly recommended for cultivation as a stable pulse.

"The condition of the garden has been well maintained during the year, and, as opportunity offers, shrubs and trees are planted out.

"I have, &c.

"NICHOLAS HOLTZE, Curator.

His Honour Mr. Justice Dashwood,
"Government Resident."

CCCCLVII.—DECADES KEWENSES.

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECADES XV.—XIX.

141. **Vavæa megaphylla**, *Wright* [Meliaceæ]; arbor procera, foliis obovato-lanceolatis petiolatis glabris penninerviis nerviis secundariis subtus prominentibus, floribus paniculam prope apices ramorum formantibus, bracteis oblongis, calyce cupulari irregulariter 5–7-lobato, petalis 5–7 oblongis contortis carinatis albis utrinque hirsutis, staminibus 12–16, filamentis latis connatis antice prope apices villosis, antheris liberis oblongis, ovario globoso apice hirsuto triloculari, stylo brevi, stigmate trilobato, ovulis in loculo quoque 2 collateralibus.

Habitat.—Fiji; Tamavua, *D. Yeoward*, 37.

Folii petiolus 2½ poll. longus, *lamina* 12 poll. longa, 6 poll. lata. *Calyx* 2 lin. longus. *Corolla* 4 lin. longa.

142. **Cymbosepalum,** *Baker* [Leguminosarum-Cæsalpiniearum genus novum.] *Calyx* tubo brevissimo, lobis 5 inæqualibus oblongis, infimo maximo ante anthesin cymbæformi demum explanato. *Petala* 5, oblanceolata, obtusa, æqualia. *Stamina* 10, petalis, æquilonga, filamentis liberis filiformibus, antheris oblongis versatilibus. *Ovarium* lineare, breviter stipitatum, ovulis 2–3; stylus gracilis, curvatus, apice incrassatus, stigmate terminali. *Fructus* ignotus.

C. Baroni, *Baker;* arbor partibus omnibus glabris, foliis simpliciter æqualiterque pinnatis, foliolis 3–4-jugis sessilibus obovatis coriaceis basi articulatis, racemo denso, pedicellis strictis sæpe 2–4-nis, bracteis parvis deltoideis cuspidatis deciduis, calycis segmentis deciduis.

Habitat.—North Madagascar, Rev. R. Baron, 6422.

Folia 1½–2 poll. longa; *foliola* 5–6 lin. longa. *Racemus* 2–3 poll. longus; *pedicelli* 2 lin. longi. *Calycis* segmentum infimum 1½ lin. longum. *Petala* 2 lin. longa.

Allied to *Cynometra*, of which there are several species in Madagascar, but differing from it by its peculiar calyx, ovules 2–3 and typically racemose inflorescence.

143. **Weinmannia stenostachya,** *Baker* [Saxifrageæ]; glabra, foliis imparipinnatis, foliolis 5–7 oblongo-lanceolatis acutis coriaceis nitidis subintegris lateralibus basi obliquis, floribus parvis in spicas densas aggregatis, calycis tubo brevissimo dentibus ovatis obtusis, petalis oblongis calyce sesquilongioribus, staminibus breviter exsertis, ovario ovoideo pubescente, stylis brevibus.

Habitat.—Northern Madagascar, *Rev. R. Baron*, 6406.

Folia 6–8 poll. longa; foliola 3–4 poll. longa, medio 12–15 lin. lata. *Spicæ* 3–4 poll. longæ. *Calyx* ½ lin. longus.

Nearly allied to *W. lucens* and *fraxinifolia*, Baker. There are many species of this genus in Madagascar, some of which yield valuable timber.

144. **Terminalia triptera,** *Stapf* [Combretaceæ]; arbor mediocris glabra, ramulis gracilibus, cortice fuscescente lenticellis pallidis crebris instructo, foliis alternis vel suboppositis ellipticis vel oblongis basi acutis apice subacuminatis subcoriaceis supra glaucis subtus pallide fulvo-viridibus subtus tenuiter-reticulatis, nervis lateralibus utrinque 6–8 pedunculo gracili, spicis gracillimis in paniculam vel in racemum terminalem dispositis vel solitariis, rhachi minute puberula, bracteis linearibus floribus paulo brevioribus mox deciduis, calyce subasymmetrico tubo ovoideo limbo breviter lateque 4-lobo, lobis subacutis, intus villoso, fructu oblongo 3-alato alis æqualibus.

Habitat.—Island of Langkaui, *C. Curtis*, 1684.

Folia 1½–2½ poll. longa, 1–1¾ poll. lata; petiolus 4–6 lin. longus. *Spicæ* ½–1 poll. longæ. *Flores* ¾ lin. longi. *Fructus* 9 lin. longus, cum alis 6–8 lin. latus.

This species is nearest allied to the Philippine *Terminalia polyantha*, Presl, from which it differs mainly in the very slender branchlets, the narrower and more acute leaves and rather smaller flowers. The number of the calyx lobes and stamens is the same in both species, viz., 4 and 8 respectively. The fruit wings

number generally 4, rarely 3 in *T. polyantha*, whilst *T. triptera* almost always has 3 wings; only once a fourth wing was found, and this was smaller than the 3 others. It is the dorsal pair of wings which is replaced by a single wing. Corresponding with this reduction, the receptacle has only 3 vascular bundles or nerves, one in front and one on each side, to the right and to the left, these three nerves running right to the tips of the corresponding sepals, whilst the fourth and dorsal sepal receives its nerve as a branch from one of the lateral bundles. This ramification takes place at the base of the cup-shaped calyx. The suppression of the dorsal vascular bundle of the receptacle and the corresponding replacement of the 2 dorsal wings by one, whilst the calyx retains its tetramerous structure, is very remarkable, and it would be interesting to know whether the trimerous structure of the receptacle is indeed the normal one, as it appears to be from the material seen.

145. **Fœtidia clusioides,** *Baker* [Myrtaceæ]; foliis coriaceis sessilibus oblancēolato-oblongis obtusis vel subacutis vena intramarginali perspicua undulata præditis, floribus solitariis axillaribus, calycis lobis oblanceolato-oblongis subpetaloideis distincte costatis, staminibus stylo duplo brevioribus.

Habitat.—North Madagascar, ***Rev. R. Baron***, 6250.

Folia 4–6 poll. longa, medio 1½–2 poll. lata, e medio ad basin sensim attenuata. *Calycis* lobi 8–9 lin. longi. ***Stylus*** 5–6 lin. longus, apice 4-cuspidatus. *Discus* floriferus 2 lin. diam.

Of this very anomalous and curious genus of Myrtaceæ three species are already known—two in Madagascar and a third in Mauritius and Bourbon. The leaves of the present plant resemble in shape those of *F. mauritiana*, but the veining is quite different; the divisions of the flower-wrapper are smaller and less coriaceous, and the stamens are much shorter.

146. **Tibouchina (Pseudopterolepis) meiodon,** *Stapf* [Melastomaceae]; caule rubellō acute angulato, angulis viridibus, patule glanduloso-hirsuto, foliis ovato-lanceolatis acutis quinquenerviis, nervis lateralibus basi plus minusve coalitis rugulosis supra æqualiter subtus in nervis venisque tantum setulosis, cymis longiuscule pedunculatis 3–7-floris, bracteis lineari-oblongis parvis apicem versus minute crenulatis et setulosis, pedicellis brevibus vel brevissimis, calycis tubo ovato-oblongo indumento eo caulis consimili vestito, lobis sublinearibus obtusiusculis tubo paulo brevioribus, petalis purpureis obovatis, antheris aureis in rostrum rubellum longiusculum attenuatis connectivo basi breviter producto curvato ultra insertionem bilobo, ovario præter setulas apicales glaberrimo, capsulæ valvis minutis.

Habitat.—Brazil. Cultivated at Kew from seeds believed to have been sent by Dr. Glaziou.

Planta culta ad 6 ped. alta. *Folia* 1–1½ poll. lin. longa, 9–10 lin. lata; petiolus 4-6 lin. longus. *Calycis* tubus 2½ lin. longus. *Petala* 3 lin. longa. ***Capsula*** vix 1½ lin. longa.

T. meiodon is nearest allied to *T. versicolor*, Cogn., and to *T. cisplatensis*, Cogn.; but it differs from them mainly in the stem, the long peduncled cymes, the long calyx lobes, and the long beak of the anthers.

147. **Memecylon strychnoides,** *Baker* [Melastomaceæ]; arborea, glabra, ramulis virgatis pallide griseis, foliis subsessilibus late oblongis obtusis vel cuspidatis basi rotundatis coriaceis e basi triplinerviis, cymis densis multifloris in paniculas pedunculatas axillares dispositis, pedicellis brevibus, bracteis ovatis parvis, calyce campanulato subtruncato, petalis late ovatis deciduis, staminibus petalis subæquilongis, stylo elongato.

Habitat.—Ikoyi, Lagos, west tropical Africa, *Millen.*

Folia 3–4 poll. longa, medio 2–3 poll. lata. *Calyx* 1 lin. diam. *Petala* 1½ lin. longa.

A small tree, with umbels of very small bluish flowers. Leaves very like those of a *Strychnos*. Fruit not seen. Its nearest ally is *M. Barteri*, Hook. fil.

148. **Argostemma concinnum,** *Hemsl.* [Rubiaceæ-Hedyotideæ]; herba caule simplici pusilla, erecta, gracillima, annua, tetraphylla, uniflora, foliis sessilibus membranaceis tenuissimis inæqualibus lineari-lanceolatis vix acutis utrinque attenuatis integris præcipue secus costam parce hispidulis, pedunculo unifloro terminali filiformi foliis breviore vel interdum paullo longiore, calycis dentibus minutis deltoideis vix acutis, corollæ fere rotatæ lobis anguste lineari-lanceolatis vix acutis apiculatis patentissimis, filamentis brevissimis, antheris in columnam quam corolla breviorem conniventibus, connectivis in appendicem longam terminalem scarioso-membranaceam productis, stigmate antheras vix superante.

Habitat.—Northern Siam; growing on moss-covered rock at Pu Kaw, near Mount Mock, at about 6000 feet, *F. H. Smiles.*

Planta 1½–2 poll. alta. *Folia* 4–14 lin. longa. *Flores* maximi circiter 1 poll. diametro.

This delicate little plant must be a charming object in a living state. Mr. Smiles describes the relatively large flowers as white with a green centre. In the dried state the green part appears as a disc at the base of each lobe of the corolla. It is nearest *A. pumilum*, Benn., a species recorded from the mountains of tropical Africa and eastern India.

149. **Mussænda pilosa,** *Baker* [Rubiaceæ]; ramulis dense pilosis, foliis breviter petiolatis oblanceolato-oblongis acutis basi cuneatis utrinque dense pilosis, floribus in corymbis terminalibus multifloris dispositis, pedicellis dense pubescentibus, bracteis linearibus pilosis, calycis lobis magnis subulatis pilosis, corollæ tubo elongato cylindrico dense piloso, lobis oblongo-lanceolatis acuminatis tubo 2–3-plo brevioribus, genitalibus in tubo inclusis, fructu magno subgloboso piloso.

Habitat.—North Madagascar, *Rev. R. Baron*, 6179.

Folia 4–6 poll. longa, supra medium 1½–2 poll. lata. *Calycis* lobi demum pollicares. *Corollæ* tubus 21–24 lin. longus. *Fructus* magnitudine nucis avellanæ.

There are several large-flowered species of this genus in Madagascar, of which this is one of the finest.

150. **Eupatorium (Heterolepis) clibadioides,** *Baker* [Compositæ]; fruticosum, glabrum, foliis oppositis subsessilibus ovatis acutis serratis utrinque viridibus, capitulis paucis multifloris corymbosis, involucro

campanulato, bracteis pauciseriatis adpressis glabris dorso conspicue 5-nervatis exterioribus parvis ovatis centralibus oblongis interioribus lineari-oblongis pallidis, acheniis glabris 4-angulatis, pappi setis firmulis ciliatis subæqulongis, corolla rubro-purpurea, stylis longe exsertis.

Habitat.—South Brazil, near Rio Janeiro, *Glaziou*, 18,339.

Folia 3–4 poll. longa. *Involucrum* 3–4 lin. diam. *Pappus* 2 lin. longus.

Nearly allied to *E. Vitalbæ*, D.C., and *E. itacolumiense*, Schultz Bip.

151. **Mikania Carteri**, *Baker* [Compositæ]; late sarmentosa, caulibus gracilibus glabris, foliis distincte petiolatis cordato-ovatis membranaceis viridibus profunde irregulariter palmatim dissectis, capitulis paucis parvis corymbosis, involucro oblongo, bracteis viridibus glabris lineari-oblongis, achenio glabro castaneo, pappo rubro tincto achenio breviore.

Habitat.—Interior of Western Lagos, *Dr. Rowland* (Sir G. Carter's expedition).

Folia majora 12–15 lin. longa et lata. *Involucrum* 2 lin. longum. *Achenium* 1 lin. longum.

The only tropical African species already known is the cosmopolitan *M. scandens*, Willd.

152. **Aspilia Glaziovi**, *Baker* [Compositæ]; perennis, herbacea, caule simplici monocephalo decumbente dense piloso, foliis sessilibus oblongis dentatis basi rotundatis utrinque viridibus hispidis, involucro campanulato, bracteis oblongis obtusis æquilongis foliaceis hispidis, receptaculi paleis linearibus rigidis integris complicatis disci floribus æquilongis, ligulis luteis involucro duplo brevioribus, achenio glabro compresso.

Habitat.—South Brazil, near Rio Janeiro, *Glaziou*, 18,318.

Caulis pedalis. *Folia* caulina 12–18 lin. longa. *Involucrum* 6 lin. longum, bracteis exterioribus 2 lin. latis.

Belongs to the section *Herbaceæ*, near *A. setosa*, Griseb.: Baker in *Fl. Bras.*, vol. vi., part 2, p. 195, tab. 63, fig. 2.

153. **Senecio arctiifolius**, *Baker* [Compositæ]; herbaceus, caule erecto elato, foliis petiolatis cordato-ovatis magnis membranaceis repandis facie demum subcalvatis dorso araneosis, capitulis paucifloris homogamis in paniculam amplam ramis corymbosis dispositis, involucro glabro viridulo, bracteis inferioribus circiter 12 lanceolatis æqualibus exterioribus paucis parvis, floribus omnibus discoideis involucro æquilongis, pappo albo flexili.

Habitat.—South Brazil, near Rio Janeiro, *Glaziou*, 18,340.

Caulis, 5–6 pedalis. *Folia* inferiora caulina pedalia. *Involucrum* 3–3½ lin. longum.

Nearly allied to *S. grandis*, Gardn.: Baker in *Fl. Bras.*, vol. vi., part 2, p. 304, tab. 83.

154. **Rhododendron Hancockii**, *Hemsl.* [Ericaceæ]; undique glabrum, ramulis floriferis graciliusculis, foliis breviter petiolatis ad apices ramulorum congestis coriaceis persistentibus oblanceolatis vel oblongis breviter acuteque acuminatis, interdum obscure ciliolatis, costa subtus elevata, venis primariis lateralibus numerosis subtus sat conspicuis marginem versus reticulato-conjunctis, gemmis floriferis 1–3 in axillis foliorum superiorum 1–2-floris, squamis per anthesin laxis cito deciduis scarioso-coriaceis ovatis vel superioribus oblongo-lanceolatis acutis ciliolatis apice tantum pilosulis, sepalis parvis inæqualibus deltoideis oblongisve, corolla infundibulari-campanulata glabra, tubo brevissimo, lobis latis obovato-rotundatis, staminibus 10 corolla brevioribus filamentis infra medium hirtellis, ovario 5–6-loculare tomentello, stylo glabro stamina superante, stigmate magno capitato.

Habitat.—China: Mongtse, province of Yunnan, in a mountain glen at 6300 feet, *Hancock*, 156.

Folia 4–8 poll. longa; petiolus 3–4 lin. longus. *Squamæ* majores 1–1½ poll. longæ. *Pedicelli* circiter pollicares. *Corolla* 3½–4 poll. diametro.

This very fine species has white flowers with a pale yellow blotch towards the base of each lobe of the corolla. It belongs to a small group having the flowers springing from the axils of the uppermost leaves, instead of a strictly terminal inflorescence.

155. **Lysimachia grandifolia**, *Hemsl.* [Primulaceæ]; herba parcissime minuteque strigillosa, ramis vel caulibus floriferis crassis, foliis alternis amplis longissime petiolatis membranaceis vel tenuiter papyraceis latis ovoideo-ellipticis breviter apiculato-acuminatis basi rotundatis vel subcuneatis leviter undulatis dense ciliolatis, floribus flavis mediocribus umbellatis, umbellis pedunculatis, bracteatis circiter 6–8-floris ex axillis foliorum superiorum ortis, pedicellis gracilibus bracteis lanceolatis ciliolatis subtentis, calycis segmentis lanceolatis sursum valde attenuatis acutissimis longitudinaliter 5-nervosis margine hispiduloso, corolla alte lobata sed, ut videtur, vix rotata, lobis latis apice rotundatis longitudinaliter tenuiterque venosis margine minute glanduloso, filamentis brevissimis deorsum dilatatis petalis annulatim adnatis, antheris magnis basi cordatis, ovario glabro, stylo filiformi stamina paullo superante, capsula ignota.

Habitat.—Northern Siam: Pu Sam Sum, *F. H. Smiles.*

Planta bipedalis (Smiles). *Folia* cum petiolo 6–9 poll. longa et usque ad 3¾ poll. lata; petiolus 1½–2½ poll. longus. *Pedunculi* circiter 2 poll. longi. *Bracteæ* 4–5 lineas longæ. *Pedicelli* 9–12 lin. longi. *Calycis* segmenta 4 lin. longa. *Corolla* circiter 6 lin. longa vel si rotata circiter 10 lin. diametro.

This is a very distinct species, differing from all others in its thick stems, large alternate leaves, and umbellate or subumbellate flowers. In habit it is more like a *Solanum* than one's idea of *Lysimachia*, although recent discoveries in China have revealed the existence of a large number, presenting great variety in habit.

156. **Mimusops dispar**, *N. E. Brown* [Sapotaceæ]; ramis cinereis glabris, foliis petiolatis cuneato-oblanceolatis obtusis juvenilibus fulvo-tomentosis adultis utrinque glabris viridibus siccis subtiliter reticulatis, floribus 12–16 ad apices ramorum umbellatim dispositis,

pedicellis calycibusque extus primum fulvo-tomentosis demum adpresse cinereo-pubescentibus, sepalis 6–8 biseriatis ovatis exterioribus acutis interioribus obtusis utrinque tomentoso-pubescentibus, petalis 18–24 triseriatis subæqualibus lineari-lanceolatis acutis glabris luteis, staminibus 6–8 quam petala brevioribus, antheris lanceolatis acutis flexuosis quam filamenta glabra subulata multo longioribus subversatilibus, staminodiis lanceolatis acuminatis canaliculatis glabris sublanato-marginatis, ovario globoso dense hirsuto, stylo elongato glabro.

Habitat.—Natal, near Mooi River in "Thorns," at 3000–4000 ft. November, *Wood*, 4472, 5425; *Gerrard*, 1482.

Foliorum petioli 2–4 lin. longi, laminæ 9 lin.–2 poll. longæ, 3–9 lin. latæ. *Pedicelli* 6–8 lin. longi. *Sepala* 3 lin. longa, 1½ lin. lata. *Petala* 2½–3 lin. longa, ½–¾ lin. lata. *Staminum filamenta* ¾–1 lin. longæ, antheræ 1½–2 lin. longæ.

A small-leaved species differing from *M. obovata*, Sond., by its more numerous and more umbellate flowers, which are also smaller and have shorter and less pointed buds. Mr. Wood states that "the fruit is yellow and well flavoured, much liked by the natives, and would, I think, be improved by cultivation." It is called by the natives "*Amapumbula*," a name that is also applied to other species of *Mimusops*.

157. **Mimusops marginata,** *N. E Brown* [Sapotaceæ]; ramis brunneis vel sordide cinereis plus minusve corrugatis glabris, foliis petiolatis elliptico-lanceolatis vel cuneato-oblanceolatis breviter et obtuse cuspidatis vel obtusis basi acutis juvenilibus fulvo-tomentosis adultis utrinque glabris viridibus, floribus 6–16 ad apices ramorum umbellatim dispositis, pedicellis ferrugineo-tomentosis, sepalis 6–8 biseriatis lanceolatis acuminatis exterioribus ferrugineo-tomentosis marginibus cinereis interioribus utrinque cinereo-tomentosis, petalis 18–24 triseriatis subæqualibus lineari-oblongis vel lanceolatis acutis glabris luteis, staminibus 6–8 quam petala brevioribus antheris lanceolatis, apiculato-acutis quam filamenta lanceolato-subulata tomentosa multo longioribus, staminodiis lanceolatis acuminatis canaliculatis extus lanato-tomentosis intus glabris marginibus lanato-tomentosis, ovario globoso-ovoideo dense hirsuto, stylo elongato glabro, fructu ellipsoideo acuto vel acuminato.

Habitat.—Natal: Inanda, *Wood,* 1661; near Umlaas, under 1000 ft. alt., *Wood,* 5340; without locality, *Gerrard,* 1186. Cape Colony: King William's Town District; Komgha, *Flanagan,* 27.

Foliorum petioli 2½–8 lin. longi, laminæ 2–5 poll. longæ, 9 lin.–2¼ poll. latæ. *Pedicelli* 1–1½ poll. longi. *Sepala* 4–5 lin. longa, 1½–2 lin. lata. *Petala* 4 lin. longa, 1–1½ lin. lata. *Staminum filamenta* 1–1½ lin. longa, antheræ 2–2½ lin. longæ. *Staminodia* 2–2½ lin. longa. *Fructus* 2 poll. longus, 1¼–1½ poll. crassus.

This is the largest-leaved of all the South African species, and somewhat approaches the Abyssinian *M. Schimperi*, Hochst., in foliage, but the flowers and fruit are very much larger. The leaves are not very coriaceous, but more of the substance of stout cartridge paper, and dry more or less of a greenish colour. According to a note from Mr. McKen, appended to an unlocalised specimen, the fruit is "of a

brownish colour like the Rose Apple." Like *M. dispar* (above described) it is also called "Amapumbulo" by the natives.

158. **Mimusops oleifolia,** *N. E. Brown* [Sapotaceæ]; ramis cinereis glabris, foliis petiolatis anguste lanceolatis utrinque angustatis apice obtusis basi acutis coriaceis glabris, floribus axillaribus solitariis, pedicellis quam petiolus subtriplo longioribus glabris vel primum minute adpresse puberulis, sepalis 8 biseriatis exterioribus lanceolatis acutis extus dense adpresse brunneo-pubescentibus intus minute puberulis interioribus lineari-lanceolatis acutis extus puberulis intus glabris ciliolatis, petalis 24 triseriatis 16 exterioribus lineari-lanceolatis acutis 8 interioribus multo majoribus lanceolatis acuminatis (siccis concavis marginibus subundulatis) glabris, staminibus 8 cum petalis exterioribus æquilongis antheris lineari-oblongis sublonge apiculatis quam filamenta subulata pubescentia triplo longioribus, staminodiis anguste lanceolato-attenuatis acutis dorso marginibusque basi adpresse hirsutis, ovario ovoideo in stylo attenuato adpresse pubescente.

Habitat.—Natal, *Gerrard*, 1642.

Foliorum petioli 2–3 lin. longi, laminæ 1–2 poll. longæ, 2½–4 lin. latæ. *Pedicelli* 8–10 lin. longi. *Sepala* 3½ lin. longa, exteriora 1¼ lin. lata, interiora ⅔ lin. lata. *Petala* exteriora 2½–2¾ lin. longa, ½ lin. lata, interiora 3–3½ lin. longa, 1 lin. lata. *Staminum filamenta* ¾ lin. longa, antheræ 2 lin. longæ. *Staminodia* 1½–2 lin. longa.

Very distinct in foliage from any other African species; the leaves in form and size resembling those of *Olea europœa*, L.

159. **Jasminum primulinum,** *Hemsl.* [Oleaceæ]; *J. nudifloro* valde affinis et hujus speciei forsan varietas speciosissima, foliis tempore florente sæpius jam bene evolutis foliolis oblongo lanceolatis minute apiculatis margine scaberulo, corollæ tubo brevi lobis latis elliptico-rotundatis sese obtegentibus.

Habitat.—Western China: hedges and copses at Mongtse, Yunnan, *Hancock*, 6.

Foliola 1–2 poll. longa, lateralia quam terminale minora. *Flores* 1¼–1¾ poll. diametro.

Whether this be entitled to rank as specifically different from *J. nudiflorum* or not, is a question that can hardly be answered without further knowledge of the two forms. It is possible that *J. nudiflorum* may have deteriorated in our climate; but there are no wild specimens in the Kew Herbarium to give evidence on this point. Generally speaking, cultivation increases the size of the flowers; yet the flowers of the wild specimens of our *J. primulinum* are nearly double the size of those of the cultivated *J. nudiflorum*. Mr. Hancock states that the flowers appear before the leaves, but in all of his specimens except one branch the leaves are fully developed with the flowers. A figure of this plant will shortly appear in Hooker's *Icones Plantarum*.

160. **Jasminum nummularifolium,** *Baker* [Oleaceæ]; sarmentosum, ramulis apice pubescentibus, foliis subcoriaceis trifoliolatis glabris foliolo terminali orbiculari, floribus in paniculas laxas dispositis, ramulis dense pubescentibus, calycis dentibus lanceolatis tubo campanulato brevioribus, corollæ albæ tubo elongato cylindrico, lobis 5 oblongis tubo triplo brevioribus.

Habitat.—North Madagascar, *Rev. R. Baron* 6271.

Foliolum terminale 2 poll. longum et latum, petiolulo semipollicari. *Calyx* 2 lin. longus. *Corollæ* tubus pollicaris et ultra.

Nearly allied to the widely-spread tropical African *J. mauritianum*, Bojer, and the Chinese *J. paniculatum*, Roxb.; Ker in *Bot. Reg.* tab. 690.

161. **Jasminum octocuspe,** *Baker* [Oleaceæ]; sarmentosum, ramulis pubescentibus, foliis simplicibus oppositis breviter petiolatis ovatis acutis subcoriaceis glabris, venis primariis erecto-patentibus, floribus paucis axillaribus, calycis tubo campanulato glabro, dentibus 8 subulatis tubo longioribus, corollæ tubo cylindrico subpollicari lobis 8 lineari-oblongis tubo brevioribus.

Habitat.—Between Tamatave and Antanarivo, Madagascar, *Rev. R. Baron*, 6051.

Folia 2–2½ poll. longa, petiolo semipollicari. *Calyx* 4 lin. longus. *Corollæ* tubo subpollicaris, lobis 7–8 lin. longis.

Of this group of Jasmines with simple leaves there are between 20 and 30 species in tropical Africa. The present species is remarkable for its subulate calyx-teeth and is nearly allied to *J. Meyeri-johannis*, Engl. of Mount Kilimanjaro, and the Mombasa *J. tomentosum*, Knobl. in *Engl. Jahrb.* XVII., p. 536.

162. **Cryptolepis obtusa,** *N. E. Brown* [Asclepiadeæ]; caule volubili glabro, foliis petiolatis oblongis obtusis retusis vel emarginatis mucronatis glabris, cymis axillaribus vel ad apices ramorum anguste paniculatis pedunculatis laxe 6–10-floris, floribus pedicellatis glabris, sepalis ovatis subacutis, corollæ tubo brevi campanulato lobis lineari-lanceolatis triplo longioribus in alabastro contortis, coronæ lobis lanceolatis acuminatis ad medium corollæ tubi insertis.

Habitat.—South-east tropical Africa: lower valley of River Shire, *Meller*; Luabo River, *Kirk* 38; Shupanga, *Kirk*; between Tette and the coast, *Kirk*; Mozambique, *Forbes*; Delagoa Bay, *Speke*.

Foliorum petioli 2–5 lin. longi, laminæ ¾–3 poll. longæ, 4½–16½ lin. latæ. *Pedunculi* 1½ lin.–1 poll. longi. *Pedicelli* 1–2 lin. longi. *Sepala* ¾ lin. longa. *Corollæ tubus* 1 lin. longus, lobi 3 lin. longi. *Coronæ lobi* ½ lin. longi.

163. **Raphionacme longifolia,** *N. E. Brown* [Asclepiadeæ]; omnino pubescens, caule simplice erecto, foliis petiolatis linearibus lineari-lanceolatis vel lineari-oblongis subobtusis vel obtuse apiculatis, cymis axillaribus subdensis multifloris brevissime pedunculatis, bracteis lanceolatis acutis, floribus pedicellatis, sepalis ovatis acutis, corollæ tubo campanulato quam lobi lanceolati acuti virides subtriplo breviore, coronæ lobis ad orem corollæ insertis tripartitis segmentis omnibus subulatis vel lateralibus deltoideo-lanceolatis segmento intermedio quam laterales 2–7-plo longiore apice tortuoso.

Habitat.—Zambesi region: Moramballa, 2000 ft., *Kirk*; Manganja Hills, *Kirk*.

Caulis 4–10 poll. altus. *Foliorum* petioli 2–4 lin. longi, laminæ 1¼–7¾ (sæpius 3–6) poll. longæ, 2–6 lin. latæ. *Pedunculi* 1–2 lin. longi. *Bracteæ* ½–1 lin. longæ. *Pedicelli* 1–3 lin. longi. Sepala ¾ lin.

longa. *Corollæ* tubus 1 lin. longus, lobi 2½–3 lin. longi. *Coronæ lobi* segmenta lateralia ⅓–1¼ lin. longa, segmentum intermedium 2–2½ lin. longum.

164. **Raphionacme scandens,** *N. E. Brown* [Asclepiadeæ]; caule longe scandente minute pubescente, foliis petiolatis oblongis oblanceolatis vel obovatis acutis vel breviter cuspidatis basi longe cuneatis obtusis minute pubescentibus siccis supra atroviridibus subtus cinereis, cymis plurimis axillaribus breviter pedunculatis vel subsessilibus densifloris pubescentibus, bracteis lanceolatis acutis, sepalis ovatis acutis pubescentibus, corollæ tubo breviter campanulato lobis patentibus oblongis obtusis extus pubescentibus intus glabris, coronæ lobis trifidis glabris segmentis omnibus subulatis intermedio apice tortuoso quam laterales quadruplo longiore, folliculis lanceolatis acuminatis minute puberulis.

Habitat.—Natal, *Gerrard*, 1312.

Foliorum petioli 1½–3 lin. longi, laminæ 2–3½ poll. longæ, ½–1 poll. latæ. *Pedunculi* 1–4 lin. longi. *Pedicelli* 1½–2 lin. longi. *Corollæ* tubus 1 lin. longus, lobis 2½ lin. longis, ¾ lin. latis. *Coronæ* lobi 2–2¼ lin. longi. *Folliculi* 1¾–2 poll. longi, 5 lin. crassi.

165. **Raphionacme grandiflora,** *N. E. Brown* [Asclepiadeæ]; caule erecto simplice (semper?) plus minusve hirta, foliis brevissime petiolatis basalibus subconfertis obovatis vel elongato-obovatis obtusis supremis distantibus lanceolatis vel lineari-lanceolatis acutis omnibus basi acute angustatis utrinque vel in nervis marginibusque tantum hirtis, pedunculis 1–2 ad apicem caulis terminalibus vel subracemosis 2–3 floris, bracteis linearibus vel subulatis hirtis, pedicellis hirtis, sepalis lanceolatis attenuatis hirtis, corollæ magnæ glabræ tubo campanulato lobis oblongo-ovatis subobtusis basi bicarinatis, coronæ lobis ad orem corollæ tubi insertis erectis rectangularibus tridentatis dentibus lateralibus brevissimis dente intermedio longitudine dimidium lobi æquante antico basi minute bidenticulato.

Habitat.—Tropical Africa: Tanganyika region, Niomkolo, *Carson* 5; Shire Highlands, near Blantyre, *Last.*

Caulis 10–12 poll. altus. *Folia* 1¼–4½ poll. longa, ¼–1 poll. lata. *Pedunculi* ½–1½ poll. longi. *Bracteæ* 3–5 lin. longæ. *Pedicelli* 4–7 lin. longi. *Sepala* 3–4 lin. longa. *Corolla* 1¼ poll. diam., tubo 3 lin. longo, lobis 7–8 lin. longis, 3–4 lin. latis. *Coronæ* lobi 5 lin. longi.

166. **Chlorocodon ecornuta,** *N. E. Brown* [Asclepiadeæ]; caule scandente glabro, foliis petiolatis ellipticis breviter et abrupte cuspidatis basi obtuse rotundatis vel subcordatis glabris, stipulis reflexis grosse dentatis, cymis axillaribus pedunculatis laxis paucifloris glabris, bracteis oblongis obtusis apiculatis pedicellos amplectentibus, sepalis ellipticis vel rotundatis obtusissimis glabris, corolla subrotata glabra lobis oblongis obtusis, coronæ lobis transversis subbilobis vel late obcordatis ecornutis.

Habitat.—South-east tropical Africa: Ribe, *Wakefield.*

Foliorum petioli ½–1 poll. longi, laminæ 3½–6 poll. longæ, 2¼–4 poll. latæ. *Pedunculi* 1–2 poll. longi. *Cymæ* rami 8 lin.–1¼ poll. longi. *Pedicelli* ½ poll. longi. *Corolla* 9–10 lin. diam. *Coronæ* lobi ¾–1 lin. longi, 1½–1⅔ lin. lati.

Similar to *C. Whitei*, Hook. f., but the coronal lobes are entirely destitute of the dorsal process characteristic of that species; the plant is more glabrous, the cymes or panicles apparently with fewer flowers, and the flowers dry a darker colour than those of *C. Whitei.*

167. **Tylophora oculata,** *N. E. Brown* [Asclepiadeæ]; caule volubili gracili glabro, foliis distantibus petiolatis oblongo-lanceolatis acuminatis basi cordatis glabris, inflorescentiæ ramis quam folia brevioribus cymis umbelliformibus duabus instructis glabris, floribus pedicellatis pallide virentibus purpureo-oculatis, sepalis late ovatis acutis ciliolatis, corolla rotata vel campanulato-rotata lobis oblique oblongis apice breviter lacerato fimbriatis glabris, coronæ lobis radiatis subquadratis obtusis crassis glabris atropurpureis, apice styli prominente pyramidato-convexo albido-viridi.

Habitat.—Sierra Leone.

Foliorum petioli 4–7 lin. longi, laminæ 2–3½ poll. longæ, 1–1¼ poll. latæ. *Inflorescentiæ* rami 1½–3 poll. longi. *Pedicelli* 4–7 lin. longi. *Sepala* ½ lin. longa. *Corolla* 6 lin. diam., lobi 2 lin. longi et lati. *Coronæ* lobi ¼ lin. longi et lati.

Described from a living plant cultivated at Kew, raised from seeds collected by Mr. Scott Elliot in Sierra Leone.

168. **Cynanchum formosum,** *N. E. Brown* [Asclepiadeæ], volubile omnino glabrum, foliis petiolatis ovatis elliptico-ovatis vel oblongo-ovatis subcuspidato-acuminatis basi cordatis lobis basalibus late rotundatis distantibus vel imbricatis, cymis lateralibus magnis pedunculatis laxe dichotomis multifloris foliis longioribus, floribus pedicellatis, sepalis ovatis acutis, corolla fere ad basin 5-lobata lobis oblongis obtusis patentibus vel reflexis pallide viridibus corona tubuloso-campanulata quinque-plicata 15-crenulata intus esquamata alba quam columna staminea duplo-longiore, folliculis lanceolato-fusiformibus glabris lævibus, seminibus ovatis concavo-convexis glabris brunneis comosis.

Habitat.—Peru: without locality, *McLean*; Arequipa, *Carson*, *Guillaume*; Huanta, and Huanuco, *Pearce.* Ecuador: Guayaquil, *Pavon.*

Foliorum petioli ⅓–1¼ poll. longi., laminæ 1¼–4 poll. longæ, ¾–2¾ poll. latæ. *Cymæ* cum pedunculo ½–2½ poll. longo 3–6 poll. longæ, 4–5 poll. latæ. *Pedicelli* 4–6 lin. longi. *Sepala* ¾–1 lin. longa, ½ lin. lata. *Corollæ* lobi 2½–3 lin. longi, 1⅓ lin. lati. *Corona* 2–2½ lin. longa. *Folliculi* 4–4½ poll. longi, 4–5 lin. crassi. *Semina* 3½ lin. longa, 1⅓ lin. lata.

This species is now in cultivation at Kew, having been raised from seeds that were sent in 1890 from Arequipa, in Southern Peru, by H. Guillaume, Esq., Consul General for Peru. It is remarkable that it has remained undescribed for so long, as it appears to have been in cultivation about 40 years ago; there being a garden specimen of it preserved in the Kew Herbarium, dated 1855. But probably it soon died out of cultivation, otherwise it would certainly have attracted the attention of some botanist, as it is one of the most distinct species in the genus, and the large, elegant cymes being freely produced, render it a rather ornamental plant from a horticultural point of view.

169. **Buddleia cuspidata,** *Baker* [Loganiaceæ]; ramulis sursum tomentosis, foliis breviter petiolatis oblongis cuspidatis crenatis basi cuneatis facie viridibus obscure pubescentibus dorso pallidis adultis pubescentibus junioribus tomentosis, spicis laxis axillaribus breviter pedunculatis simplicibus vel furcatis, calycis tubo campanulato dense tomentoso dentibus parvis ovatis, corollæ tubo cylindrico calyce triplo longiore lobis patulis parvis orbicularibus, staminibus in tubo inclusis.

Habitat.—North Madagascar, *Rev. R. Baron*, 6489.

Folia 6–8 poll. longa medio 3–3½ poll. lata. *Spicæ* 2–4½ poll. longæ. *Calyx* 1 lin. longus. *Corolla* 3 lin. longa. *Fructus* ignotus.

Nearly allied to *B. axillaris*, Willd., on which Radlkofer in Bremen *Abhandl.*, viii. 451, founds his genus *Adenoplusia.*

170. **Cordia Irvingii,** *Baker* [Boragineæ]; arborea, ramulis dense pubescentibus, foliis magnis longe petiolatis obovatis obtusis integris basi rotundatis facie viridibus glabratis dorso pubescentibus, floribus parvis in cymas scorpioideas densas longe pedunculatas paniculatas dispositis, calyce griseo-tomentosa tubo infundibulari verticaliter plicato dentibus parvis ovatis, corollæ tubo brevi, lobis oblongis, staminibus inclusis.

Habitat.—Interior of Western Lagos, near Abbeokuta, *Dr. Irving*, *Dr. Rowland.*

Folia inferiora 9–10 poll. longa, 6–7 poll. lata. *Calyx* 3–4 lin. longus. *Fructus* ignotus.

Near *C. Milleni* and *C. populifolia*, Baker in *Kew Bulletin*, 1894, p. 27.

171. **Ipomœa repandula,** *Baker* [Convolvulaceæ]; herbacea, caule gracili late volubili piloso, foliis longe petiolatis membranaceis magnis cordato-ovatis repandulis, utrinque tenuiter pilosis, floribus in axillis foliorum pluribus conglomeratis, pedicellis brevibus pilosis, bracteis minutis, sepalis ovatis acutis pilosis, corollæ parvæ albidæ limbo obscure 5-lobato.

Habitat.—Interior of Western Lagos, *Dr. Rowland.*

Folia 3–5 poll. longa et lata. *Sepala* 2 lin. longa. *Corolla* 6 lin. longa.

Belongs to the large section *Strophipomœa*, near *I. eriocarpa*, R. Br.

172. **Lepistemon leiocalyx,** Stapf [Convolvulaceæ]; caule volubili fulvo-hirsuto, foliis cordato-ovatis acuminatis interdum basin versus obscure trilobis utrinque fulvo-velutinis petiolo, ut pedunculi, fulvo-hirsuto, floribus numerosis umbellatim congestis, sepalis rotundato-ovatis obtusis glaberrimis, corolla flava tubo urceolato limbo brevi filamentis glabris, squamis basalibus papillosis, ovario disco alto cincto 2-loculari, loculis 2-ovulatis.

Habitat.—Frequent in the secondary forest near Keni, South Travancore, *T. F. Bourdillon*, 88.

Folia ad 2 poll. longa, 1½–2¼ poll. lata; petiolus 1–1½ poll. longus. *Pedunculus* 1–2½ poll. longus. *Pedicelli* ad 3 lin. longi. *Calyx* 2 lin. longus. *Corolla* 6 lin. longus.

The discovery of a representative of this genus in the South of the Deccan Peninsula is very interesting, as it is a link between the African and the Indo-Malayan area of the genus. There is only one species known from Africa, ranging almost over the whole tropical portion of the continent, whilst *Lepistemon Wallichii*, Chois. is distributed from the Khasia Hills and Assam to Borneo and the Philippines; *L. asterostigma*, K. Schum, is limited to New Guinea, and *L. Fitzalani*, F. Muell., [Syn. *L. urceolatus*, F. Muell., and probably also *L. Lucae*, F. Muell.] to North Queensland. The species do not differ much, but it seems that *L. leiocalyx* approaches closer to the Indo-Malayan than to the African species.

7456? 173. **Brandisia racemosa,** Hemsl. [Scrophularineæ]; fruticosa, sarmentosa ?~ ramulis floriferis gracilibus pubescentibus, internodiis quam folia brevioribus, foliis oppositis vel subopposítis petiolatis rigide papyraceis vel subcoriaceis ovatis oblongis vel rarius lanceolatis acutis crenato-serrulatis, serrulis apiculatis, basi rotundatis rarius subcordatis vel subcuneatis glabrescentibus, costa atque venis primariis paucis crassis subtus elevatis, floribus in racemos terminales elongatos dispositis, pedicellis in axillis bractearum oppositarum sæpius geminis brevissimis, bracteis foliis similibus sursum gradatim minoribus vel fere obsoletis, calycis campanulati lobis subæqualibus brevibus deltoideis obtusis, tubo extus puberulo intus valde hirsuto, corolla præcipue intus hirsuta insigniter inæqualiter bilabiata curvato-ventricosa, labio postico galeato-complicato breviter bilobato lobis rotundatis, labio antico brevissime tridentato dentibus lateralibus labio postico adhærentibus denti intermedio intermediis saltem dimidio breviore, staminibus 4 inclusis antheris barbatis per paria conniventibus, filamentis filiformibus glabris, ovario apice hirsutulo, stylo filiformi inter lobos labii superioris brevissime exserto, capsula (matura non visa) ovoidea calyce inclusa seminibus numerosissimis.

Habitat.—Western China: in shady copses, Mongtse, Yunnan, *Hancock*, 143.

Folia cum petiolo 1–2½ poll. longa; petiolus 1½–3 lin. longus. *Racemi* circiter semipedales; pedicelli 1–3 lin. longi. *Flores* 1–1¼ poll. longi. *Corollæ* tubus brevissimus; labium posticum dentem intermedium labii antici circiter 6–7 lin. superans.

Mr. Hancock describes this as having conspicuous, rich-red flowers; and, as they are borne in great profusion, this shrub must be very ornamental. It differs strikingly from the other known species in having racemose flowers, and in the very great inequality of the lips of the corolla, the upper lip being 6–7 lines longer than the middle lobe of the lower lip.

174. **Didissandra longipes,** *Hemsl.* [Gesneraceæ-Cyrtandreæ]; fere undique glabra, caule, ut videtur, brevissimi gracili paucifoliato, foliis oppositis longissime petiolatis crassis vix coriaceis oblongis obovatis vel ovalibus obtusis undulatis subtus pallidis, venis primariis lateralibus utrinque sæpius 4 subtus sat conspicuis, pedunculis gracilibus elongatis terminalibus vel pseudoterminalibus apice 4–6 floris, pedicellis gracilibus, bracteis minutis, floribus speciosis, calycis segmentis fere liberis lanceolatis acute acuminatis, corolla tenuissima declinata, tubo curvato lato ventricoso, limbo 5-lobo inæqualiter bilabiato, labio antico

multo longiore, lobis omnibus rotundatis, staminibus 4 inclusis incurvis filamentis filiformibus glabris, antheris per paria cohærentibus, ovario puberulo, stylo filiformi breviter exserto, capsula lineari recta puberula, seminibus minutis fere linearibus inappendiculatis.

Habitat.—Western China: in crevices of shady rocks, in a dark limestone glen, Mongste, Yunnan, *Hancock*, 50.

Folii lamina 2–4 poll. longa; petiolus 1½–3 poll. longus. *Pedunculi* 7–15 poll. longi. *Pedicelli* ½–1½ poll. longi. *Calycis fructiferi* segmenta 5–6 lin. longa. *Capsula* 1½–2 poll. longa.

Mr. Hancock does not describe the colours of the flowers of this evidently very elegant plant. All one can say from the dried specimens is that they are pale and spotted.

175. **Petrocosmea grandiflora**, *Hemsl.* [Gesneraceæ-Cyrtandreæ]; acaulis, cæspitosa, foliis numerosis appressis longe vel longissime petiolatis mollibus papyraceis undique longe sericeo-pilosis oblongis lanceolatis ovatisve rarius fere orbicularibus vix acutis basi cuneatis vel interdum rotundatis, petiolo gracili, pedunculis gracilibus unifloris perraro bifloris medio bibracteatis, bracteis parvis linearibus, calycis segmentis fere liberis inæquilongis anguste lanceolatis acutis pilosis, corolla extus parcissime hirsutula obliqua inæqualiter bilabiata, labio postico multo minore, lobis omnibus latis rotundatis, staminibus 2 filamentis brevibus incrassatis hirsutis antheris magnis loculis connectivo incrassato hirsuto sejunctis, ovario hirsuto, stylo hirsuto gracili bis curvato id est rursum prorsum curvato, capsula ignota.

Habitat.—Western China: crevices of limestone precipices at 6400 feet, Mongste, Yunnan, *Hancock*, 115.

Folia maxima cum petiolo 6 poll. longa; lamina ½–2½ poll. longa. *Pedunculi* 1–2 poll. longi. *Calycis* segmenta 1½–2 lin. longa. *Corolla* 1–1¼ poll. diametro; labium anticum 10–12 lin. latum.

Mr. Hancock describes the flowers of this charming little plant as cobalt blue. The only other species known is *P. sinensis*, Oliv., in Hooker's *Icones Plantarum*, t. 1716.

176. **Vitex syringæfolia**, *Baker* (Verbenaceæ); fruticosa, glabra, foliis longe petiolatis simplicibus oblongis acutis integris basi rotundatis utrinque viridibus, floribus in cymas sessiles multifloras dispositis, pedicellis glabris, calyce campanulato viridi lobis parvis obtusis, corollæ tubo cylindrico, lobis obtusis tubo æquilongis.

Habitat.—Interior of Western Lagos, *Dr. Rowland.*

Folia 3–4 poll. longa, 2–2½ poll. lata. *Calyx* fructiferus 3 lin. longus. *Corollæ* tubus 1½ lin. longus lobos æquans.

Allied to *V. simplicifolia*, Oliv. in *Trans. Linn. Soc.*, XXIX. 136, t. 130.

177. **Clerodendron cæruleum**, *N. E. Brown* [Verbenaceæ]; fruticosum, ramulis tetragonis junioribus bifariam puberulis senioribus glabris cinereis, plus minusve verrucoso-tuberculatis, foliis oppositis petiolatis ovatis ovato-lanceolatis vel suboblongis acutis basi cuneato-acutis utrinque grosse 3–4-dentatis raro integris supra et subtus ad nervos sparsissime pubescentibus marginibus ciliolatis nervis primariis

utrinque 3–5 subtus prominentibus, pedunculis axillaribus quam folia brevioribus gracilibus unifariam puberulis apice 1-vel 3-floris bracteatis, bracteis subulatis glabris, pedicellis brevibus patentibus vel subdeflexis glabris, calyce campanulato ad medium quinquifido glabro dentibus deltoideo-attenuatis acutis, corollæ tubo subrecto subcompresso calyce duplo longiore, limbo inæqualiter 5-lobo cæruleo lobo inferiore cuneato-obovato subtruncato lobis intermediis brevioribus ellipticis obtusis superioribus majoribus oblique ellipticis obtusis, staminibus styloque longe exsertis incurvis, fructu quadrilobo glabro.

Habitat.—South Africa: Natal, *Gerrard*, 1252, Mooi River Valley, 2000–3000 ft., *Sutherland*; Swaziland, *Mrs. K. Saunders.*

Foliorum petioli 1–6 lin. longi, laminæ 4 lin.–2¼ poll. longæ, 2 lin.–1 poll. latæ. *Pedunculi* ¾–1¼ poll. longi. *Bracteæ* 1–1½ lin. longæ. *Pedicelli* 1–2 lin. longi. *Corollæ* tubus 3½ lin. longus, limbus 7–8 lin. diam. *Stamina* 8 lin. longa.

Allied to *C. myricoides*, R. Br., but easily recognised by its much narrower and very acute calyx-teeth.

178. **Clerodendron polycephalum**, *Baker* [Verbenaceæ]; fruticosum, erectum, ramulis validis dense ferrugineo-pilosis, foliis ternatis vel oppositis distincte petiolatis ovatis cordatis cuspidatis, integris utrinque viridibus pubescentibus, floribus in cymas multifloras conglomeratas pedunculatas terminales dispositis, pedunculis pedicellisque pubescentibus, calyce piloso tubo obconico dentibus ovatis tubo æquilongis, corollæ tubo cylindrico calyce 2–3-plo longiore, lobis parvis obovatis, staminibus elongatis.

Habitat.—Interior of western Lagos, *Dr. Rowland.*

Folia 3–4 poll. longa, 2–2½ poll. lata. *Calyx* 1½ lin. longus. *Corollæ* tubus 3–4 lin. longus, limbus expansus 1½ lin. diam.

Ranks amongst the small-flowered species of the subgenus *Euclerodendron* near *C. formicarum*, Gürke in Engl. *Jahrb.* XVIII. 179.

179. **Nepenthes Smilesii**, *Hemsl.* [Nepenthaceæ]; parva, acaulescens? vel saltem ramulis floriferis interdum valde abbreviatis fere undique plus minusve puberulis, foliis confertis angustis utrinque attenuatis, ascidiis mediocribus recurvo-erectis fere cylindricis, costis anticis anguste alatis fimbriato-ciliatis vel fere obsoletis, calcare obsoleto, peristomio cylindraceo transversim crebre costato, operculo fere orbiculari infra multiglanduloso, floribus ♂ ferrugineo-pubescentibus simpliciter racemosis, racemis longe pedunculatis, pedicellis brevissimis, perianthii segmentis ovalibus concavis, antheris 8 uniseriatis.

Habitat.—Northern Siam: grows on grass land on the ground, at Baw Saw, Nam Kawng, *F. H. Smiles.*

Lamina folii 4–6 poll. longa. *Cirrhus* 1–2 poll. longus. *Ascidia* 2–3 poll. longa. *Operculum* 9–15 lin. latum. *Scapus* 10–12 poll. altus.

Mr. Smiles describes this as having a green pitcher with a red cover and a red border.

180. **Ophiopogon clavatus**, *Wright* [Hæmodoraceæ-Ophiopogoneæ]; herba, rhizomate gracili repente squamis sparse vestito, foliis aggregatis

subterminalibus petiolatis oblongis apice obtusis basi acutis 11-nerviis, racemis interfoliaceis paucifloris, perianthii segmentis exterioribus acutis interioribus quam exteriores latioribus dilute rubentibus marginibus undulatis, staminibus 6 filamentis brevibus antheris lanceolatis prope apices dehiscentibus, ovario infero triloculari, ovulis 2 in quoque loculo collateralibus, stylo filiformi.

Habitat.—China: Patung, *A. Henry*, 6065; Kuei, *A. Henry*, 6065A.

Petiolus 2 poll. longus; *lamina* 2–3 poll. longa, 6 lin. lata. *Perianthium* 9 lin. diam. *Antheræ* 3 lin. longæ. *Stylus* 4 lin. longus.

Allied to *O. dracænoides*, Hook. f., but differing in the shape of the leaves and the larger but less numerous flowers.

181. **Stemona erecta,** *Wright* [Roxburghiaceæ]; herba erecta, glabra, caule angulato, foliis verticillatis ellipticis cuspidatis vel breviter et subito acuminatis basi in petiolum brevem contractis trinerviis vel cum nervis arcte marginalibus 5-nerviis, nervis transversis pluribus approximatis, floribus in axillis cataphyllorum prope basin caulis, pedunculis floribus subæquilongis basi decurvis prope apicem recurvis floribus hinc erectis, perianthii segmentis anguste lanceolatis acutis 2 exterioribus 7-nerviis interioribus 9-nerviis, staminibus perianthii segmentis paullo brevioribus filamentis brevibus, antheris linearibus cum connectivo in appendicem planam anthera longiorem producto, ovario uniloculari, ovulis 3–6 erectis.

Habitat.—China: Nanking, *C. Schmidt*, 1541, Herb. Faber.

Folia 2–2½ poll. longa, 1 poll. lata. *Perianthii* segmenta 6–7 lin. longa.

The nearest ally of this species is *Stemona sessilifolia*, Miq., figured in the *Somoku Zusetsu*, Vol. II., t. 55, which also has the leaves arranged in whorls of fours, but differs in having the flowers on much longer pedicels and solitary from the axils of fully developed leaves.

182. **Smilax scobinicaulis,** *Wright* [Liliaceæ-Smilaceæ]; frutex ramosus, ramis canaliculatis spinis tenuibus atris vestitis, foliis ovatis acutis glabris 7-nerviis, stipulis ad petiolum adnatis apice cirrhiferis, pedunculo quam petiolus multo breviore, pedicellis circa 8, floribus ignotis, perianthio persistente normali, bacca globosa.

Habitat.—China: Hupeh, *A. Henry*, 6554.

Folia 5 poll. longa, 3 poll. lata; *petiolus* 1 poll. longus. *Pedicelli* 3 lin. longi. *Bacca* 4 lin. diam.

Readily distinguished from the other Chinese species by the numerous black, fragile prickles, which clothe the stem, as in some forms of *Smilax californica*, A. Gr. (Watson, *Bot. Calif.* ii., p. 186).

183. **Smilax microphylla,** *Wright* [Liliaceæ-Smilaceæ]; suffruticosa, caule ramosissimo plus minusve angulato spinis parvis vestito, foliis oblongis subacutis glabris subtus glaucescentibus 3–5 nerviis, floribus ♂ circa duodecim, segmentis perianthii recurvis interioribus quam exteriores angustioribus, staminibus 6 antheris albis, rudimento ovarii nullo, floribus ♀ non visis, bacca globosa nigra parva 1-sperma.

Habitat.—China: Hupeh, Ichang, *A. Henry*, 1521, 3089, 3089A, 3980, 3996, 4410.

Folia 1–1½ poll. longa, 3–10 lin. lata; *petiolus* 2 lin. longus. *Pedunculus* 2 lin. longus; *pedicelli* 5 lin. longi. *Bacca* 3 lin. diam.

This appears to be related to *Smilax obtusa*, Bth., from Mexico. It can be distinguished from the other Chinese species by its small, glaucous, somewhat coriaceous leaves.

745 184. **Smilax (Eusmilax) flaccida**, *Wright* [Liliaceæ-Smilaceæ]; suffruticosa, ramosa, inermis, foliis lanceolatis acuminatis rectis vel leviter curvatis glabris nervis primariis 3–5 ultimis reticulatis conspicuis, petiolis vix vaginatis cirrhiferis, inflorescentia umbellata, ♂ floribus circa duodecim, segmentis perianthii ligulatis, staminibus 6 filamentis filiformibus quam perianthium paulo brevioribus, rudimento ovarii nullo, inflorescentia ♀ floribus circa 6, perianthio masculo simili sed segmentis sæpe plus minusve per paria adhærentibus, ovario triloculari, ovulis geminatis, stigmatibus 3 subsessilibus, fructu ignoto.

Habitat.—China: Hupeh, Ichang, *A. Henry*, 3630, 3630A, 3630B.

Folia 3 poll. longa, ½–1 poll. lata; *petiolus* 3–6 lin. longus. *Pedunculus* ♂ 1 poll. longus; ♀ 6 lin. longus; *pedicelli* ♂ et ♀ 3 lin. longi. *Perianthium* 3 lin. longum.

The leaves of this plant somewhat resemble those of *S. parvifolia*, Wall., but the stem has not the same zigzag habit.

185. **Smilax (Eusmilax) megalantha**, *Wright* [Liliaceæ-Smilaceæ]; fruticosa, caule flexuoso leviter sulcato paucis spinis brevibus compressis armato, foliis ovatis acutis subtus glaucescentibus nervis primariis 3, petiolo usque ad medium vaginato, vagina apice cirrhifera, corymbo subumbellato ad axillam folii rami lateralis producto, bracteolis subulatis, flore ♂ perianthio 6-partito, segmentis lanceolatis acuminatis exterioribus quam interiores latioribus, staminibus 6, filamentis filiformibus quam perianthii segmenta brevioribus, flore ♀ non viso, fructu globoso sæpius 1–spermo.

Habitat.—China: Szechuen, *Pratt*, 811; Mt. Omei, *Faber*, 241.

Folia 3½ poll. longa, 2 poll. lata; *petiolus* 1 poll. longus. *Perianthium* 6 lin. longum. *Fructus* 6 lin. diam.

This species somewhat resembles *Smilax stenopetala*, A. Gr., but differs in the inflorescence, which, instead of arising directly from the axil of a mature leaf, consists of a contracted raceme borne in the axil of a very young leaf, rarely an inch long, situated on an axillary branch about 4 inches long, at the base of which a large bud-scale persists opposite to the leaf-sheath.

6420 186. **Paradisia minor**, *Wright* [Liliaceæ-Asphodeleæ]; herba rhizomate brevissimo, foliis radicalibus linearibus acutis leviter carinatis glabris, scapo erecto racemoso, bracteis late triangularibus membranaceis, pedicellis brevibus, perianthio campanulato segmentis albis membranaceis oblanceolatis marcescentibus, staminibus quam perianthii segmenta paulo brevioribus, antheris elongatis curvatis basi bilobis dorsifixis versatilibus, ovario ovoideo, ovulis pluribus, stylo filiformi staminibus æquilongo.

Habitat.—China: Yunnan, at 6000 ft., *W. Hancock*, 94.

Folia 8 poll. longa, 4 lin. lata. *Scapus* 1½ ped. longus. *Pedicelli* 3 lin. longi. *Perianthium* 1 poll. longum. *Filamenta* 4 lin. longa; *antheræ* 5 lin. longæ. *Stylus* 9 lin. longus.

6474 187. **Allium (Rhiziridium) Henryi,** *Wright* [Liliaceæ-Allieæ]; herbaceum glabrum, rhizomate perpendiculari fibris reticulatis dense vestito, foliis linearibus acuminatis quam scapus paulo longioribus, scapo tenui glabro vel leviter pubescenti flores 5–7 gerente, spatha scariosa ventricosa apice acuminata quam pedicelli dimidio breviore, segmentis perianthii ovatis acutis cæruleo-purpureis, filamentis basi breviter connatis quam perianthium vix longioribus iis staminum interiorum dentibus lateralibus brevibus instructis, ovario trilobo, stylo quam perianthium sesquilongiore.

Habitat.—China: Hupeh, Hsingshan, *A. Henry*, 6924.

Rhizoma 5 poll. longum. *Scapus* 8 poll. longus. *Pedicelli* 6–8 lin. longi. *Perianthii* segmenta 3 lin. longa, 1½ lin lata.

This is allied to *Allium przewalskianum β planifolium*, Rgl., from which it differs in having longer leaves and pedicels, a shorter broader spathe, and fewer flowers.

188. **Aloe Buchanani,** *Baker* [Liliaceæ]; acaulis, foliis productis 8–10 lineari-subulatis distichis confertis facie profunde canaliculatis dorso rotundatis sæpissime prope basin minute albo-maculatis, aculeis marginalibus paucis minutissimis, scapo simplici elongato bracteis pluribus vacuis parvis ovatis adpressis prædito, racemo denso paucifloro, pedicellis longissimis ascendentibus, bracteis parvis ovatis viridibus imbricatis, perianthio cylindrico pallide rubello sursum viridulo, tubo brevissimo, lobis linearibus, genitalibus perianthio æquilongis.

Habitat.—Tropical Africa: Shiré highlands, *Buchanan.* Described from a plant that flowered at Kew, December 1894.

Folia pedalia vel sesquipedalia basi 6–7 lin. diam. *Scapus* sesquipedalis. *Pedicelli* 1½–2 poll. longi. *Bracteæ* 5–6 lin. longæ. *Perianthium* pollicare.

Very near *A. Cooperi*, Baker (*Bot. Mag.*, tab. 6377), from which it differs by its smaller flowers and leaves rounded on the back.

189. **Dipcadi occidentale,** *Baker* [Liliaceæ]; bulbo magno subgloboso tunicis exterioribus membranaceis brunneis, foliis linearibus firmis planis, synanthiis glabris, pedunculo gracili elongato, racemo laxo paucifloro subsecundo, pedicellis brevibus ascendentibus, bracteis parvis ovatis, perianthio viridi, tubo oblongo lobis interioribus lineari-oblongis erectis, exterioribus complicatis falcatis interioribus paulo longioribus.

Habitat.—Tropical Africa: near Wallis, Scarcies, on hard dry laterite, *Scott Elliot*, 4840 (Sierra Leone Boundary Commission).

Bulbus 2 poll. diam. *Folia* semipedalia 3–4 lin. lata. *Scapus* 4–6-pollicaris. *Racemus* 2–6 florus, 1–3 poll. longus. *Pedicelli* 1½ lin. longi. *Perianthium* 6 lin. longum, lobis exterioribus 2–3 lin. longis.

Allied to the Abyssinian *D. tacazzeanum* and *unifolium*.

190. **Alocasia æquiloba,** *N. E. Brown* [Aroideæ]; omnino glabra, foliorum petiolo quam lamina longiore pallide viridi, lamina hastato-sagittata lobo terminalo oblongo apice breviter cuspidato acuto margine

undulato-sinuato lobis basalibus oblongo-lanceolatis obtusis antico subæquilongis sinu hyperbolico late sejunctis integris pagina superiore viridi nitida inferiore pallide viridi, costæ anticæ nervis utrinque 4–6, costarum posticarum nervis 3–6 exterioribus 2–3 interioribus omnibus utrinque parum prominentibus, pedunculo tereti pallide viridi, spathæ tubo anguste ellipsoideo-oblongo antice plano dorso convexo viridi nitido quam lamina oblonga acuta reflexa marginibus revolutis duplo breviore omnino viridi extus nitida, spadice quam spatha multo breviore parte fertili quam appendice tereti subobtusa lævi ochracea sublongiore, ovariis sublaxis 6–7-cyclis globoso-ellipsoideis stylis brevibus stigmatibus parvis 3-lobis pallidissime flavo-viridibus, organis neutris floribusque masculis ochraceis.

Habitat.—German New Guinea.

Foliorum petioli 1–2 ped. longi, lamina petiolo æquilonga, lobo terminali 7–12½ poll. longo, 3–6 poll. lato, lobis basalibus 6½–11½ poll. longis, 1¾–2½ poll. latis. *Pedunculus* 9 poll. vel ultra longus. *Spathæ tubus* 1¼ poll. longus, 5 lin. crassus, lamina 2½ poll. longa, 11 lin. lata. *Spadix* 2¾ poll. longus, parte feminea 6 lin. longa, neutra 6 lin. longa, mascula 7 lin. longa, appendice 14 lin. longa, 2 lin. crassa.

A very distinct species, intermediate between the entire-leaved kinds and those which have pinnatifid leaves, like *A. sanderiana*, Bull, and *A. Portei*, Engl. It has been introduced into cultivation by F. Sander & Co., to whom Kew is indebted for a dried and a living leaf and inflorescence, from which the above description was made. The inflorescence was from a small plant, and it doubtless attains larger dimensions than those given above.

CCCCLVIII.—MISCELLANEOUS NOTES.

The death of the celebrated horticulturist, Mr. J. W. THOMSON, at the ripe age of 90, is recorded in the *East Sussex News* for Friday April 5, 1895. He was educated at Shrewsbury Grammar School, the late Charles Darwin being a fellow pupil, and he was employed in the Royal Gardens under Mr. Aiton in 1819. He afterwards became head gardener at Syon House, the residence of the Duke of Northumberland. In 1835, after five years' service at Syon House, he went into business as a nurseryman. Last year he paid a visit to Kew, and shortly afterwards wrote the following letter. The Kew Guild is an Association of Kew Gardeners, Past and Present, formed in 1893. It publishes annually a journal for circulation among its members, and the number for 1894 contains a portrait of Mr. Thomson, with a very interesting paper by him, entitled "Reminiscences of an Old Kewite."

Hortulan Lodge, Hayward's Heath,
November 1, 1894.

SIR,

WHEN visiting Kew Royal Botanic Gardens, September 11th, I omitted to inform you that by my will I had arranged and invested a sufficient sum in the New South Wales Stock, now paying 3½ per cent., as would realise annually five guineas, my present contribution (a mere mite) towards the expenses incurred annually by the publication of the Kew Guild, which is to be paid every year on my birthday, the 25th day of March, as a donation in perpetuity, and for all time, as a gift from J. W. Thomson, in 91st year; the Stock will stand in the name of the director for the time being.

I also intend, so long as the Almighty in his great goodness permits me to occupy a *locus standi* in boundless space, also to perambulate *terra firma*, to contribute my annual donation of five guineas to the Guild.

I am, &c.,
(Signed) J. W. THOMSON.

W. T. Thiselton-Dyer, Esq.,
C.M.G., C.I.E., F.R.S., Ph.D., F.L.S.

News was received with great regret at Kew in March last of the death of Mr. WILLIAM CROWTHER, who for the last four years has been the able and efficient curator of the Botanic Station at Aburi, on the Gold Coast. Mr. Crowther was appointed in 1889 (*Kew Bulletin*, 1891, pp. 169-173). He fully justified the selection for the post, and, as shown in these pages (*Kew Bulletin*, 1892, pp. 14 and 297; 1893, pp. 160–62), the station at Aburi, covering nearly forty acres of land, had been admirably planned and was established with valuable economic trees and shrubs brought together from all parts of the world. In addition, there were large nurseries for supplying seedling plants of coffee, cacao, and spices to the natives for starting new industries. In the work of the station the curator had from the first the judicious and sympathetic guidance of Sir William Brandford Griffith, K.C.M.G., to whom indeed it owes both its inception and success.

In 1893 Mr. Crowther visited the West Indies to observe the cultivation of coffee, cacao, and other tropical economic plants. On his return he prepared a very interesting report giving an account of his mission, pointing out the special subjects likely to be successfully cultivated in West Africa (*Kew Bulletin*, 1894, p. 227).

Mr. Crowther's removal is a great blow to botanical enterprise in this part of the world. The station at Aburi is at an elevation of 1500 ft., and attached to it is a sanatorium for European officers. The locality is, therefore, regarded as comparatively healthy. From a despatch addressed to the Colonial Office by Sir W. Brandford Griffith, it appears that Mr. Crowther died from abscess of the liver. His Excellency, who was at Aburi at the time, adds, "I saw him frequently during his illness. He gradually sank and died on the 16th March. His remains were interred in the cemetery at Accra, his funeral being largely attended by several public officers and others who regretted his untimely death. By this sad event the Government has lost one of its most valuable officers."

Botanical Magazine.—The most remarkable plant represented in the number for March is *Weldenia candida* (Lampra volcanica), a member of the *Commelinaceæ*, referred to in the *Bulletin* for 1894, p. 135, on the occasion of its flowering at Kew. It has a curious history, which is not fully given in the notes in question. Dr. J. H. Schultes, junior, first described it, in 1829, from specimens purporting to have been collected by Karwinski in the Nevado de Toluca, Mexico, and two other Mexican localities are recorded; yet it appears that no recent collector has met with it in Mexico, and there are no Mexican specimens at Kew. Hartweg collected it in the Volcan de Agua, Guatemala, in 1837, and the late Mr. Bentham shortly afterwards described and published it under the second name cited above. From that date until 1893 it would seem that this singular plant had not been re-discovered, and then it was found in the same locality where Hartweg collected it. Evidently it is an exceedingly rare plant. *Heptapleurum venulosum*, var. *erythrostachys* (Araliaceæ) is a small tree with a bright red inflorescence, which flowered in the Temperate House. The plant was presented to Kew by M. de Falbe, formerly Danish Minister to the Court of St. James. *Disa sagittalis*, a relatively inconspicuous South African orchid, was presented to the Royal Gardens by H. J. Elwes, Esq. *Veronica loganioides*, one of the numerous New Zealand species, flowered in the Rock Garden at Kew in 1893; and *Schinus dependens* (Duvaua dependens), a native of Chili, is a hardy shrub of no great ornamental character, though a conspicuous object when covered with a profusion of its small yellow flowers. It was raised at Kew from seed obtained from the Botanic Garden of Santiago.

The April number consists entirely of plants that have flowered at Kew. *Macaranga porteana* (Euphorbiaceæ) is a native of the Philippine Islands, where it was discovered by Mr. Marius Porte, and after whom it is named. A young plant was sent from the Jardin des Plantes, Paris, in 1892, and it has long been a very striking object in the Victoria House. *Saintpaulia ionantha* is a charming little cyrtandreous plant from the mountains of eastern tropical Africa. It so strongly resembles the Chinese *Petrocosmea* that it has been somewhat prematurely reduced to this genus. The Kew plants were raised from seed obtained from a continental nurseryman. *Ixianthes retzioides* (Scrophularineæ) is an exceedingly rare, indeed, almost extinct, South African shrub, having large yellow flowers. Plants were raised at Kew from seed sent in 1891 by Prof. MacOwan, Government Botanist at Capetown. *Piptospatha Ridleyi*, a small aroid, discovered in Johore, and sent to Kew by Mr. H. N. Ridley, Director of the Garden and Forest Department of the Straits Settlements. *Magnolia parviflora*, a native of Japan, was figured from a plant, obtained from Yokohama, which flowered in the Arboretum last June.

Hooker's Icones Plantarum.—The third part of the fourth volume, (fourth series) appeared in April, and contains, among other things, figures of the principal rare plants of Mr. Bent's Hadramaut expedition, described in the *Kew Bulletin*, 1894, pp. 328–343. A second figure of the very singular Chinese tree, *Eucommia ulmoides*, Oliv., represents both male and female flowers, which were previously unknown. Professor D. Oliver now refers it to the neighbourhood of *Trochodendron*. Another very anomalous plant figured is *Circæaster agrestis*, Maxim. It was at first suggested that its affinity lay in the direction of the Chloranthaceæ, but Professor Oliver is now inclined to regard it as a degraded type of the Ranunculaceæ, though in habit it is exceedingly different. *Achilus*, the proposed new genus of Scitamineæ (*Kew Bulletin*, 1895, p. 39), is figured; and Dr. H. Baillon has since sent specimens of what is apparently a second species from Cambodia, which seem to indicate that the flowers figured are imperfect or abnormal. It is expected, however, that Mr. Smiles will send fuller material, when the structure will again be investigated. The remainder of this part of the *Icones* is chiefly devoted to African plants.

Organization of the Fossil Plants of the Coal-Measures.—Professor W. C. Williamson, and Dr. D. H. Scott, the honorary keeper of the Jodrell Laboratory, are the authors of an elaborately illustrated article on the minute structure of the *Calamites*, *Calamostachys* and *Sphenophyllum*, lately published in the *Philosophical Transactions* of the Royal Society of London. The leading idea was to elucidate the structure of fossil plants by exact comparison with the structure of living plants. The paper opens with a detailed comparison of the primary structure of the stem of *Calamites* with that of the stem of *Equisetum*, followed by an account of the secondary growth and branching. Homosporous and heterosporous species of *Calamostachys* are described; and it is suggested that we have here a genus in which the first rise of the phenomenon of heterospory can be traced. In the discussion on the affinities of *Sphenophyllum* it is stated that the structure is now known throughout with great accuracy, that its position still remains an isolated one, and that it is a cryptogamous type not represented in the existing flora. The illustrations are exceedingly good, especially those reproduced from Mr. George Brebner's beautiful drawings.

Himalayan Rubi.—In the *Kew Bulletin*, 1894, p. 196, a note was published respecting a Himalayan *Rubus* cultivated at Kew, that had proved of special interest in Queensland. This was *Rubus ellipticus*, Smith (R. flavus, *Ham.*). The fruit is of "a pale yellow colour when ripe, and possesses the full raspberry flavour with a delightful subacidity which renders it most palatable." The plant has now also been introduced to Jamaica, where no doubt it will flourish at the Hill Garden in the Blue Mountains. The distribution of these temperate Himalayan *Rubi* under cultivation, is a fact of some interest. *R. biflorus*, Ham., a strong rambling shrub, with the stem and branches white with glaucous bloom grows in the open air at Kew, while another species the very variable *R. lasiocarpus*, Smith, with the leaflets hoary with white tomentum, flourishes at the Glasnevin Botanic Gardens. In Mr. Fawcett's interesting report for the year 1894, just issued, it is further recorded that *Rubus racemosus*, Roxb., which he calls the "Himalayan Blackberry," has been a success in Jamaica and plants have been distributed. Sir Joseph Hooker (*Flora of British India*, ii., p. 340), regards this species as an extreme form of *R. lasiocarpus*, Smith, readily distinguished by the copious glandular bristles and hairs, the usually densely tomentose branches, corymbs, petioles, &c., and the prickly calyx and large petals ; the leaflets too are usually broader, very coriaceous, glabrous above or with sometimes copious almost woolly hairs. The petals are large and red.

Rubus moluccanus, widely distributed in India and ascending to an altitude of 7,000 feet in the Sikkim Himalaya, is a robust climber with palmately lobed leaves nearly a foot in diameter. There is a specimen of it in the temperate house at Kew, where its stems, often 40 feet long, hang from the gallery.

Another Himalayan *Rubus* now widely distributed in different parts of the world is *Rubus rosæfolius*, Smith (*Bot. Mag.*, t. 6970). Aiton in the second edition of *Hortus Kewensis* says that it was introduced to this county by Sir Joseph Banks from the Cape of Good Hope and St. Helena. Sir Joseph Hooker found it abundant in the latter island in 1840. According to Mr. Baker (*Flora of Mauritius*, p. 96) it was introduced to that island from the Malay Archipelago in 1780. It is now found also in many of the West Indian Islands, especially in Martinique and Dominica. Dr. Nicholls, F.L.S. (*Kew Bulletin*, 1888, p. 207), includes it under the fruits of Dominica. It is known there as Fraisè or Red-berry. He adds "this fruit, which evidently escaped from cultivation many years ago, is now wild and occurs abundantly along the roadsides in several districts of the island. By careful cultivation it might be so improved as to make a very fine fruit; but in its wild condition it is too full of seeds to entitle it to take high rank. It is eaten with cream like strawberries and is also made into jam."

Rubus rosæfolius is often cultivated in gardens where its evergreen foliage, the delicate white of the petals and above all the red fruit, copiously produced, render it very attractive. There is a variety (*R. rosæfolius* var. *coronarius*) with double white flowers (*Bot. Mag.*, t. 1783) cultivated as a garden shrub in Japan, and sometimes seen in greenhouses in this country.

Supplement to Pritzel's Inconum Botanicarum Index.—Since the publication of the original work it has been the practice at Kew to enter in an interleaved copy references to all figures of plants as they are published; at least so far as it could be done. Some monographs, such as those in the *Annals of the Calcutta Botanic Garden*, in which figures are given of all the Indian species, have not yet been entered. Sargent's *Silva* of North America is another instance; but in each case little difficulty is experienced, because all the species are figured and systematically arranged. Nevertheless, it is desirable that they should eventually be entered, because it is not every botanist that is aware of the existence of these books.

Last year Dr. Balfour, the Regius Keeper of the Edinburgh Botanic Garden, obtained the sanction of the authorities to have a transcript made of all the manuscript additions in the Kew interleaved copy of Pritzel, for the use of the Edinburgh establishment. This was accordingly done; a strictly alphabetical arrangement being followed. It was evident that great convenience and saving of time would be gained by duplicating this for Kew. The manuscript entries in the Kew Pritzel are in a variety of hands, some of them not very legible, very much crowded in some places, and not in one alphabetical sequence. Consequently it was decided to have three type-written copies made; one each for Calcutta, Kew and Edinburgh; each establishment paying a third of the cost of production. This Kew Supplement was completed by the end of February, and contains upwards of 50,000 entries. During the time the work was in progress about 1,000 entries accumulated, and these have been added in the blank columns left for the purpose of containing the additions.

Newfoundland Plants.—Through Dr. B. L. Robinson, Curator of the Gray Herbarium, Harvard, Kew has received a set of about 260 species of dried plants, including a number not recorded from the island in any of the existing lists, the most complete of which is embodied in Macoun's Catalogue of Canadian Plants. One of the most striking features in the relatively poor flora of Newfoundland is formed by the numerous Vacciniaceæ and Ericaceæ, especially the prostrate, shrubby, berry-bearing kinds, which clothe the swamps and open woods. Macoun enumerates upwards of twenty species belonging to the two natural orders in question.

North Mexican Plants.—Kew has acquired by purchase a collection of dried plants, numbering about 550 species, collected by Dr. C. Lumholtz. They are from the Sierra Madre region in the north-west, where Seemann collected forty-five years ago. There is a considerable number of novelties including a *Pinus* and a *Bravoa*—Amaryllidaceæ.

Orange-Growing in Florida and Jamaica.—The recent very cold weather in the Southern United States appears to have had a very destructive effect upon the orange trees, pine apples, and other sub-tropical plants cultivated in Florida. This is a matter of more than local interest for a large number of Englishmen have settled in the State, and much money and labour have been expended in establishing large and hitherto flourishing orange groves. The *Garden and Forest* (February 13, 1895, p. 70) states: "The second period of freezing weather in Florida was even more disastrous to the orange groves than the first, when, as we have stated before, the crop of fruit was practically destroyed. The older trees, which had not been killed had begun to put forth leaf-buds and fruit-buds, and this second cold wave has evidently destroyed these and apparently ruined the next crop." In a later number (February 27, p. 90,) the same authority remarks: "But for the disastrous periods of zero weather which desolated the orange groves of Florida, the New York market would now have been well supplied with fruit from that State. Probably the number of oranges destroyed in Florida would amount to as many as the entire California crop, which is arriving under the most favourable conditions for profit to the growers." Dr. Mead quoted in the *Gardeners' Magazine* (March 9, 1895), furnishes further particulars: "All early vegetables, as well as the whole crop of oranges, are ruined; one hundred thousand boxes of strawberries which would have been shipped between February 20 and March 10 are destroyed. Pine apples have been nearly all destroyed. This serious frost coming after the previous destruction of the orange crop means absolute ruin to the Florida growers as now there will be no crop next year, if indeed, Florida is not permanently disabled in the matter of citron culture."

The effect on garden plants was equally destructive. The following extract is taken from a very interesting letter addressed to Kew, on the 25th February last, by Mr. H. Nehrling, of the Public Museum, Milwaukee:—"In my South Florida garden, south of latitude 28, almost all my plants were killed by the great freezes on December 28 and February 7. The temperature fell as low as 16° F. above zero. Thousands and thousands of orange trees were killed, and most of my tropical plants such as *Pleroma*, *Meyenia*, *Hibiscus*, *Araucaria*, *Bignonia*, *Cestrum*, *Iochroma*, *Melaleuca*, *Metrosideros*, *Tabernæmontana*, &c., &c., were hurt beyond recovery. Even such plants as *Daphne adnata*, *Clethra arborea*, *Hydrangea hortensis*, *Myrtus communis*, *Nerium Oleander*, *Illicium religiosum*, *Michelia fuscata*, *Gardenia florida*, &c., &c., were killed to the ground. The species of *Phœnix* lost all their leaves, while most of the *Cocos* and *Sabals* were only slightly injured. *Acrocomia Totai* lost many of its leaves and even *Chamærops humilis* suffered a little.

"I think the plants of Southern Japan and China will be grown more in the gardens of Florida in future as they are perfectly adapted to the soil and climate."

One effect of the disaster that has overtaken Florida in the matter of oranges is to turn the attention of growers to the advantages possessed by Jamaica and the other islands in the West Indies for fruit growing. In the speech by Sir Henry Blake, K.C.M.G., at the opening of the Legislative Council of Jamaica on February 12, he said:

"I have received from Florida several applications for information as to the prospects of orange-growing, from persons whose groves have been ruined by the late severe frost, and who realise the precarious nature of the fruit industry in that State on account of the periodical cold waves from which it has suffered. I have directed that the fullest information shall be prepared for transmission to the inquirers. From the excellence of the Jamaica orange, grown as it is without cultivation or care, it is evident that with a soil and climate especially suited to the growth of the citron tribe this Island could with systematic cultivation produce enormous crops of oranges, lemons, grape-fruit and shaddock equal in quality to that of any fruit in the American or European market. I shall welcome the introduction of a regular cultivation that ought to be as valuable and as stable as the cutivation of sugar or bananas."

It is probable that the influx of a few capable men from Florida, with good experience in growing and packing oranges might be of signal service to Jamaica. A more careful cultivation and selection of the best sorts of oranges for export purposes from Jamaica have been urged from Kew for many years. In a recent letter addressed to the Colonial Office the following remarks were made :—"It has always been a matter of extreme surprise that the export of oranges from Jamaica has made so little progress of late years. It is stated, on trustworthy authority, that those already grown are superior to those produced in Florida, and a good market might be found for them in the United States and the United Kingdom. To stimulate this industry, amongst other steps, a small intermediate garden should be started on the orange zone at 2–3,000 ft. elevation. Here the best obtainable kinds might be grown, their cultural treatment demonstrated, and instruction given in the proper modes of handling and packing." It might be added that the Botanic Gardens in Jamaica have for a long period endeavoured to encourage an orange industry in the island. From the returns furnished in the Annual Reports it appears that orange plants at the rate of 10,000 to 50,000 a year have been distributed at nominal rates. Also lemons, citron lemons, and the best Mandarin and Tangerine oranges. Jamaica has now an exceptional opportunity, and it should take advantage of the present circumstances and endeavour to establish an orange industry as one of the chief staples of the island.

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

Nos. 102, 103.] JUNE and JULY. [1895.

CCCCLIX.—MAPLE SUGAR.

(*Acer saccharinum*, Wangh.)

Valuable sugar and syrup are obtained in the United States and Canada from the stem of the Sugar Maple. The stems are bored in early spring and the juice, collected in vessels, is boiled as quickly as possible to prevent fermentation. The industry is carried on over an extensive tract of country and the produce is used locally. Little, if any of it, comes into external commerce. Hitherto it has been difficult to obtain reliable information as to the extent or value of the maple sugar industry in the United States. From the following extract it will be noticed that about 10 million pounds of maple sugar are produced annually, and that the value of the sugar and syrup together reaches about one million dollars.

The Sugar Maple (*Acer saccharinum*, Wangh.) is a noble tree, often 100 feet high with a trunk 3 or 4 feet in diameter. The leaves are three to five-lobed with rounded sinuses. The fruit, very similar to our maple (or sycamore), is smooth, the wings vary from half an inch to rather more than an inch in length and are broad, thin, and usually spreading. The tree is one of the most widely and generally distributed of any in eastern North America. It extends southward from Canada along the Alleghany Mountains to Georgia and Florida; westward along the valleys of the St. Lawrence to Minnesota, Nebraska, Kansas, and Eastern Texas.

This tree was introduced to England in 1735. The timber is more valuable and more generally used than that of any other American maple. Accidental forms of the wood, known as "curled maple" and "bird's-eye maple," are highly prized in cabinet-making.

"Much of the splendour of the American forests in early autumn is due to the abundance of the sugar maple, which is unsurpassed in brilliancy of colour by any upland tree."

The nutritious and sugary properties of the sap of the maple were known to the Indians before the earliest settlement of Europeans.

Maple sugar is identical chemically with that yielded by the sugar-cane.

"It has the appearance of raw cane-sugar, except that it is rather darker in colour, and it loses in refining the peculiar flavour for which it is valued. It often contains a considerable per-centage of malate of lime, a substance that feels like sand in the mouth, and seems to increase in quantity in proportion to the length of time the tree has been tapped."

Professor Sargent (*Silva of North America*, ii. 98), from whom the above extracts have been taken, quotes as follows :—

"Sugar-making begins with the upward flow of the crude sap, or between the end of February and the beginning of April, as the season is early or late, and continues during three or four weeks. Trees 20 or 30 years old are considered the most productive and yield the purest sugar, although sap can be drawn from the tree year after year without seriously injuring it. Trees exist in northern New York which are known to have yielded sugar every year for a century, and which, while much swollen about the base from repeated wounds, are still vigorous and fruitful. A tree of the average size will give in an ordinary season 20 or 30 gallons of sap, usually containing from 2 to 3 per cent. of sugar, or from $2\frac{2}{3}$ to $3\frac{1}{2}$ ounces per gallon. Individual trees, however, vary much in productiveness; and those standing by themselves on high ground, with a large development of roots and branches, generally yield more sap than trees crowded together in the forest. The highest per-centage of sugar recorded is 10·20 for a tree in Vermont, in a small flow late in the season, 5·01 per cent. being the average of this tree during the season." (Wiley, *Bull.* 51, *Chem. Div. Dept. Agric.*, 1885.)

The following article taken from the *Louisiana Planter*, February 2, 1895, gives the present production of maple sugar in the United States :—

"During the existence of the bounty law it was thought that data would be secured covering the entire production of maple sugar in the United States, but the great number of small producers who made no application for the bounty, owing to the small amounts involved, has rendered the data very incomplete, although the total production of this article is far greater than most persons imagine. From the last report of the Commissioner of Internal Revenue, we learn that the maple sugar produced during the fiscal year ended June 30, 1892, by licensed maple sugar producers who submitted reports, amounted to a little short of four millions of pounds. During the fiscal year ended June 30, 1893, the production reported aggregated over 7,500,000 pounds, and for the year ending June 30, 1890, the data secured indicates about the same production. From this it would seem that the total production of maple sugars in the United States exceeds 10,000,000 pounds, and as this article is sold as candy rather than sugar, and as an immense amount of maple molasses or syrup is sold without being manufactured into sugar, it is evident that the total production of sugar and syrup from maple sap reaches about $1,000,000 annually.

"New Hampshire leads in maple sugar production with a yield of about 5,000,000 pounds. New York follows with the production exceeding 1,500,000 pounds, Pennsylvania about half a million, Ohio a little less than half a million, other States reporting smaller quantities. Over 3,600,000 trees were tapped to produce 7,500,000 pounds of sugar, indicating an average production of about two pounds per tree per season."

Brigade-Surgeon Aitchison, C.I.E., F.R.S., who was much interested in the introduction of the sugar maple into Kashmir, applied to Kew for assistance in obtaining a supply of seed. After some difficulty a sufficient quantity was obtained through the kind offices of Messrs. Thomas Meehan & Son, of Germantown, Philadelphia, and despatched to India. They remark in the letter of advice :—"You are no doubt well aware that in the case of the double samara of the sugar maple one of them is almost invariably hollow. It is rare to find both good."

CCCCLX.—ANBURY, CLUB-ROOT, OR FINGER AND TOE.

(With plate.)

This unfortunately well-known plant malady has been made the subject of the most careful scientific investigation. Of this a good account is given by Mr. Carruthers in the *Journal of the Royal Agricultural Society*, 3rd ser., vol. iv., pp. 334–339 (1893). The following description is borrowed from it:—

"This disease, caused by *Plasmodiophora Brassicæ*, Woronin, shows itself by the tops of the attacked turnips becoming yellow and soft and drooping in the heat of the sun. When the bulb is taken out of the ground the rootlets which issue from it, and through which the plant obtains its nourishment from the soil, are found to be covered with irregular warty excrescences. In the progress of the disease the bulb itself becomes rotten, and in the advanced stages a most offensive putrid odour is given off."

The appearance of the diseased roots is well illustrated in the accompanying illustration, which is borrowed from von Tubeuf's *Pflanzenkrankheiten*.

For a description of the organism discovered by Woronin, which is the cause of the disease, reference may be made to Mr. Carruther's paper.

The late Dr. Augustus Voelcker made an elaborate inquiry into the conditions favourable to it. These were published in the *Journal of the Royal Agricultural Society* for 1859 (vol. xx., pp. 101–105). He "concluded that the cause of anbury is justly referred in most instances to the absence or insufficiency of lime in light sandy soils."

"It has since been observed . . . . the application of lime, chalk, or marl, has prevented the reappearance of the disease in fields where it had previously been present."

"It has recently been asserted that the sulphur present in manures saturated with sulphuric acid favours the appearance of the disease (Carruthers, *l.c.*, p. 335). In the *Journal of the Royal Agricultural Society* for 1894 (3rd ser., vol. v., pp. 808–811), Professor William Somerville describes some important experiments which show that soils free from the disease can be easily infected with it. Two of his conclusions may be quoted:—

"1. That Finger and Toe (locally known in the north as 'grub') is an extremely infectious disease, and may be easily induced by inoculating a soil perfectly free from the disease—and holding much more than an average quantity of lime—with soil from a diseased field.

"2. That such diseased soil may be easily disinfected by lime, which points to the pathological phenomena being due to an organism, presumably *Plasmodiophora Brassicæ*" (p. 811).

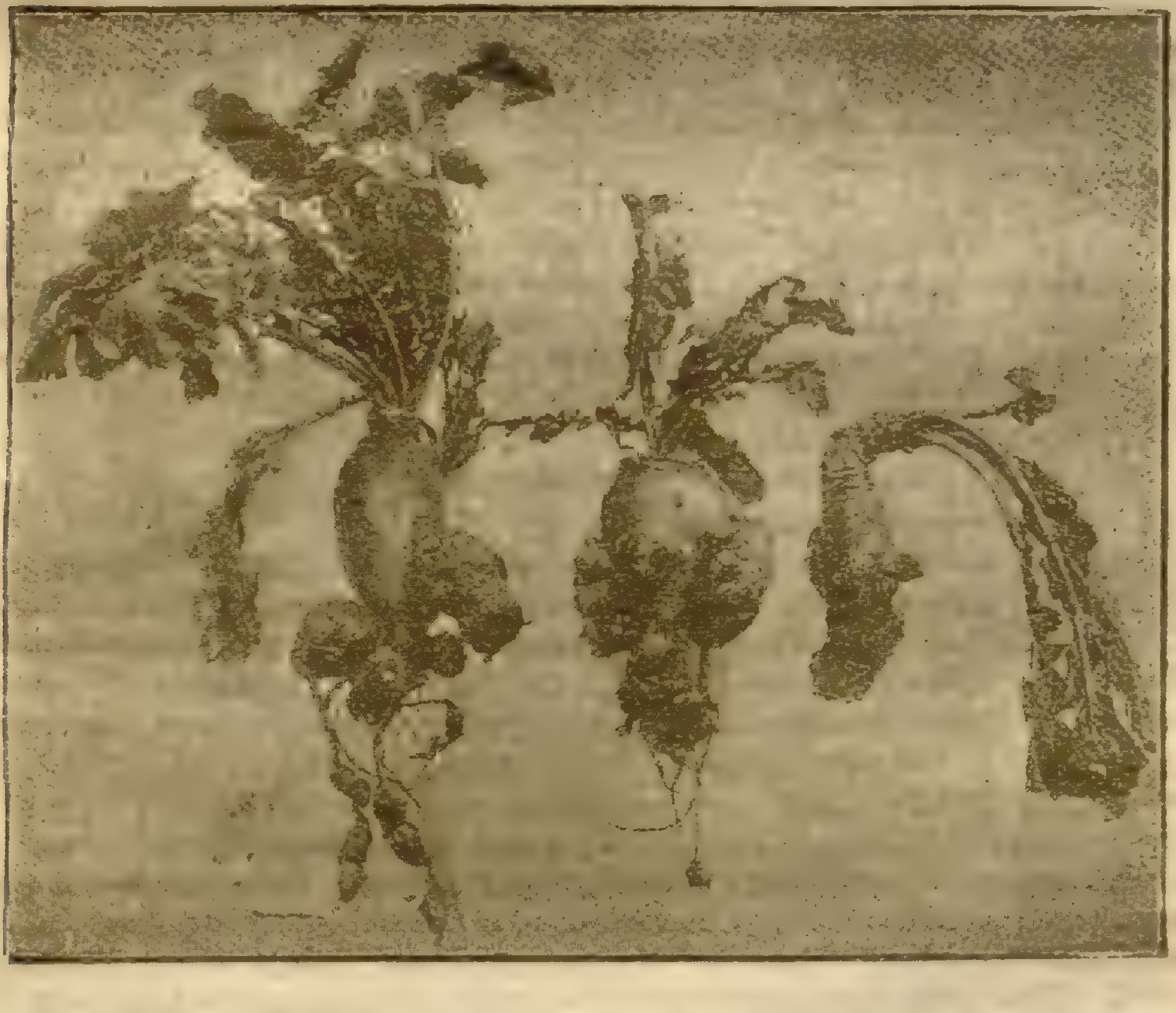
The study of the conditions favourable or inimical to the organism, *Plasmodiophora*, which is the cause of the disease, have now been carried a step further, as the result of investigations made during the last four years in the Jodrell Laboratory of the Royal Gardens by Mr. G. Massee, F.L.S., a member of the scientific staff.

The important result is that free acid present in the soil is favourable to the organism, while a free alkali is unfavourable. This explains the old belief that sulphuric acid favoured the disease, though the suggestion that this was due to the sulphur present is, it would seem now, not to be the true solution.

The following account is extracted from Mr. Massee's paper printed in the *Proceedings of the Royal Society*, vol. 57, pp. 330–332:—

The disease attacks turnips, rape, cabbages of all varieties, radishes, and, in fact, most cultivated plants belonging to the order *Cruciferæ*. Several common weeds are also attacked, namely, charlock (*Brassica Sinapistrum*, Boiss.), garlic-mustard (*Sisymbrium Alliaria*, Scop.), treacle-mustard (*Erysimum Cheiranthoides*, Linn.), and shepherd's purse (*Capsella Bursa-pastoris*, D.C.). The last-named is reported from the United States by Halsted,* and has not been observed to be diseased in Britain, although one of our commonest weeds.

Berkeley† appears to have been the first to investigate the disease from a scientific standpoint, and although he did not succeed in determining the true cause, distinctly states that microscopic examination revealed the presence of a factor previously unknown in connexion with plant diseases. Furthermore, Berkeley pointed out that wood ashes were a cure for the disease, and supposed this to be due to the presence of potash salts in the ash.



Plasmodiophora Brassicæ, Wor. (after von Tubeuf).

The following is an account of experiments conducted during four successive years at Kew.

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* New Jersey Agric. Coll. Expt. Station; Bull., 98 (1893).
† *Gard. Chron.* p. 500, 1856.

1. Healthy seedling cabbages planted in soil that had two years previously produced a crop of diseased cabbages, became diseased. Check plants from the same batch of seed, grown in sterilised soil, remained free from disease.

A. *Experiments conducted in a Sterilised Solution of Stable Manure.*

2. The contents of two flasks were infected by adding crushed tubercles of a diseased cabbage root. Two per cent. of a saturated solution of potassium hydrate was added to the contents of one flask, and two per cent. of commercial sulphuric acid to the other. A young cabbage plant free from disease was then placed in each flask. At the end of two months the plant in the flask containing potassium hydrate was growing vigorously and perfectly free from disease, whereas the plant growing in the solution containing sulphuric acid was badly diseased, much more so than check plants growing in infected soil free from acid, for the same period of time. Similar experiments made during successive years always yielded the same result.

3. Two young cabbage plants showing decided symptoms of disease were placed in flasks containing the same proportions of potassium hydrate and sulphuric acid respectively as in Experiment 2. At the end of two months the plant growing in the solution containing potassium hydrate appeared to be perfectly healthy, the indications of nodules present on the root at the commencement of the experiment having become effaced by subsequent growth. The plant growing in the solution containing sulphuric acid was badly diseased.

Similar results were obtained in Experiments 2 and 3, when potassium hydrate was replaced by ammonium hydrate, and sulphuric acid by hydrochloric acid.

4. Two diseased seedling cabbages were placed in separate flasks of the sterilised solution. The liquid in one flask was saturated once a week with carbonic dioxide, the contents of the second flask not being interfered with in any way. At the end of two months both plants had the disease developed to the same extent, proving that carbonic acid is neutral as regards the development of *Plasmodiophora*.

B. *Experiments conducted with Sterilised Soil.*

5. Two pots of soil, sterilised by steam, were infected with the crushed roots of diseased cabbages. The soil in one pot was mixed with quicklime, that in the other with bone manure, having an acid reaction. A healthy cabbage seedling was planted in each pot, and at the end of two months the plant in the pot containing lime was perfectly healthy, whereas the plant in the soil containing acid bone manure was badly diseased.

6. Two pots containing soil mixed with quicklime and acid bone manure respectively had a diseased cabbage seedling placed in each. At the end of two months the disease was more developed in both seedlings than at the time of planting; proving that the presence of lime will not arrest the disease when the plants are once attacked.

Summary.

The foregoing observations and experiments demonstrate the following points:—

1. That in addition to cultivated plants, several common weeds belonging to the order *Cruciferæ* are attacked by the *Plasmodiophora*.

Hence the necessity for preventing the growth of such weeds in fields and hedge banks.

2. That the germs of disease are present in soil that has produced a diseased crop, and retain their vitality for at least two years.

3. That the development of *Plasmodiophora* is favoured by the presence of acids, and checked by the presence of alkalies, agreeing in this respect with the fungi rather than with bacteria.

4. For the purpose of sterilising infected soil, experiments prove that either a dressing of lime or a manure containing potash salts is effective, the last being most valuable, as it not only destroys the germs in the soil but also arrests the disease in seedling plants, and at the same time supplies one of the ingredients necessary for the healthy growth of turnips.

CCCCLXI.—FLORA OF THE SOLOMON ISLANDS.

The novelties of several small collections, from the above-named islands, presented to Kew within the last few years, have already been published in the *Annals of Botany*, v. (1891), pp. 501–508, pl. 27; vi. (1892), pp. 203–210, pl. 11–14; *Journal of the Linnean Society*, xxx. (1894), pp. 163–165 and 211–217, pl. 9–11; Hooker's *Icones Plantarum*, 4th series, iii. (1894), pl. 2207, 2247, and 2248; and *Kew Bulletin*, 1894, pp. 211–215.

In March of the present year a further small parcel was received from the Rev. R. B. Comins, including also a few species from Torres Islands and Banks Islands, situated between the Solomon group and the New Hebrides.

Unfortunately Mr. Comins's opportunities for collecting and preserving plants are very slight; yet in this small collection of about 30 species a dozen remain unidentified with previously described species. The material of some is, however, insufficient for description. Omitting the very common plants of no special interest, the following is an enumeration of the last consignment:—

DILLENIACEÆ.

Dillenia ?—The petals are wanting, and the anthers have been eaten by insects, so that it is uncertain whether it belongs to this genus or *Wormia;* but from the foliage and calyx it appears to be an undescribed tree.

Habitat.—Florida, Solomon Islands, *Comins*, 291.

Mr. Comins notes that the natives declare that this tree, which occurs in the forests and attains a height of 100 feet, never ripens seeds, and can only be propagated by cuttings.

ANONACEÆ.

Oxymitra (§ Goniothalamus) macrantha, *Hemsl.*; arbor usque ad 30 ped. alta, apice tantum ramosa (*Comins*), ramulis primum parce ferrugineo-puberulis, internodiis brevibus, foliis mediocribus petiolatis vix coriaceis ovato-oblongis apice obtusis vel rotundatis glabrescentibus, venis primariis lateralibus utrinque circiter 12 curvatis prope marginem inter se conjunctis, floribus lateritiis in trunco productis (*Comins*) breviter pedunculatis pendulis ex adumbratione Cominsiana solitariis coriaceis glabris, calyce obscure trilobato lobis obtusis, petalis 3 exterioribus valde elongatis angustis caudatis vix acutis, petalis 3 interioribus brevibus supra medium connatis breviter unguiculatis corollam fenestratam formantibus, connectivo ultra loculos antherarum capitato, stylis filiformibus elongatis, carpellis numerosissimis magnis arcte confertis brevissime stipitatis pyriformibus vel ovoides apiculatis glabris minute verrucosis, seminibus 5–6 in quoque carpello orbicularibus compressis tomentosis.—*Hook, Ic. Pl.* tt. 2399, 2400.

Habitat.—Florida, Solomon Islands, *Comins*, 293.

Folia 4–6 poll. longa. *Calyx* circiter 1 poll. diametro. *Petala* exteriora usque ad 7 poll. longa, interiora circiter 7 lin. longa. *Torus* maturus 1–1¼ poll. diametro. *Carpella* 2 poll. longa. *Semina* 9–10 lin. diametro.

Baillon and other writers who combine *Oxymitra*, *Goniothalamus*, and the Fijian *Richella*, have been followed here, as there is no character of importance to separate them. The present is a somewhat anomalous species, the carpels being 5–6 ovulate and, sometimes, at least, all the ovules mature into seeds. *Goniothalamus uvarioides*, King (*Ann. Calc. Bot. Gard.* iv. t. 143), is also exceptional in having 4-seeded carpels.

Mr. Comins describes this as a riverside tree, attaining a height of 30 feet, and having a naked trunk on which the long pendent brick-red flowers are borne down to within 2 feet of the ground, and at intervals of about a foot.

SIMARUBEÆ.

Samadera indica, Gærtn.—The distribution of this tree is remarkable. It inhabits South Concan, Malabar, Ceylon, Borneo, and the Philippines.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 261.

MELIACEÆ.

Dysoxylum sp. ?—Specimen mancum. This may be a new species, but as there are only detached flowers, and a small portion of a large pinnate leaf, the point is doubtful.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 303.

OLACINEÆ.

Lasianthera papuana, Becc.—Flowering specimen of this singular plant. It is figured by Beccari, *Malesia*, i. t. 3.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 41.

Stemonurus ? megacarpus, *Hemsl.*; arbor magna (*Comins*) foliis alternis breviter petiolatis subcoriaceis leviter obliquis ovato-oblongis obtusis vel acutis glabris, venis primariis lateralibus utrinque 8–10 subtus prominentibus, costa crassa, floribus purpureis (*Comins*) parvis anguste cymoso-paniculatis ramulis crassis subcarnosis, pedicellis brevibus calyce cupulari inæqualiter 4–5-lobato lobis rotundatis, petalis 4–5 valvatis oblongo-lanceolatis obtusis intus leviter carinatis, filamentis

brevissimis dilatatis, connectivo incrassato ultra loculos antherarum producto inappendiculato, loculis discretis, ovario 1-loculari, ovulis 2 collateralibus pendulis, fructu drupoideo magno ovoideo unispermo, endocarpio crasso dense suberoso, semine anguste ovoideo compresso, raphe lata prominente per totam seminis longitudinem extensa.—*Hook. Ic. Pl.* t. 2398.

Habitat.—Solomon Islands: San Cristoval, *Comins*, 89.

Folia 8–12 poll. longa et 4–5 poll. lata. *Panicula* 4–5 poll. longa (imperfecta?). *Pedicelli* 2–3 lin. longi. *Flores* circiter 3 lin. diametro. *Fructus* absque epicarpio carnoso 3 poll. longus, endocarpio 3–6 lin. crasso. *Semen* 2–2¼ poll. longum.

The genera of the *Icacineæ*, especially those to which the plant described is most nearly allied, have been so differently limited by different botanists that it is difficult to decide to which to refer a plant combining some of the characteristics of *Stemonurus* and *Gomphandra*, as defined by certain botanists. In the ovary and fruit *S.? megacarpus* strongly resembles *S. scorpioides*, Becc. (*Malesia*, 1. p. 113 t. 6), but the inflorescence and stamens are very different, and nearer those of some of his species of *Gomphandra*. Having to deal with only one species, the question of the genus must therefore remain uncertain.

AMPELIDEÆ.

Leea sambucina, Willd.—Widely spread in India and Malaya, extending to the Philippine Islands and Australia.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 307.

LEGUMINOSÆ.

Millettia ? gracillima, *Hemsl.*; frutex alte scandens (*Comins*), undique glaber, ramulis floriferis graciliusculis teretibus, foliis alternis graciliter petiolatis, foliolis 3–5 paribus oppositis omnibus petiolulatis (terminali longiore) tenuibus papyraceis obovato-lanceolatis vel oblongis vix acutis obtusis vel utrinque rotundatis, venis primariis lateralibus utrinque circiter 6, venis ultimis minute reticulantis, floribus albis (*Comins*), fasciculato-racemosis racemis gracillimis axillaribus simplicibus vel pauciramosis, pedicellis filiformibus, bracteis minutissimis, calyce pubescente brevissime 5-lobato, lobis 4 posterioribus latis rotundatis, anteriore angustiore carinato acuto, petalis subæquilongis breviter unguiculatis liberis glabris vexillo orbiculari emarginato vel breviter bilobato inappendiculato, alis oblongis apice rotundatis, carina obtusa fere recta, staminibus glabris 9 alte connatis vexillari omnino libero, ovario hirsuto sessili 3-ovulato, stylo sursum glabro incurvo stamina subæquante, legumine ignoto.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 300.

Folia superiora 7–8 poll. longa; foliola inæqualia 2½–6 poll. longa; petioluli circiter 2 lineas longi. *Racemi* 5–15 poll. longi. *Pedicelli* 2–4 lin. longi. *Flores* 5–6 lin. longi. *Legumen* ignotum.

Mr. Comins describes this as "a climber on other trees, cutting into their bark until it almost buries its stem in theirs." In the absence of the pod its position is uncertain, but being one of the most elegant plants in the collection it has been described as far as the material goes.

Hansemannia oblonga, *Hemsl.* in *Kew Bulletin*, 1892, p. 125.—Further specimens showing that the leaflets sometimes attain at least 9 or 10 inches in length.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 304.

COMBRETACEÆ.

Gyrocarpus americanus, Jacq.—This is one of the few littoral trees common to America and Polynesia; and it ranges all round the tropics, including Polynesia, eastward to Tahiti, but it is not recorded from the Hawaiian Islands.

Habitat.—Torres Islands, *Comins*, 310.

MELASTOMACEÆ.

Medinilla cauliflora, *Hemsl.*; frutex in arborum truncos epiphyticus (*Comins*), undique glaber, ramis floriferis crassis et ad nodos incrassatis, foliis ternis (an semper?) petiolatis subcoriaceis oblongo-lanceolatis leviter obliquis obtusis basi subcuneatis 3–5-nerviis venis obsoletis, floribus mediocribus albis (*Comins*) 4-meris ad nodos vetustos aphyllos fasciculatis distincte pedicellatis, pedicellis filiformibus, basi squamis minutis suffultis, calycis urceolati limbo brevi annulato truncato dentibus punctiformibus, petalis oblongo-spathulatis obtusis, staminibus 8 consimilibus fere æqualibus, filamentis linearibus tenuissimis, antheris fere rectis vel leviter curvatis anguste clavatis apice uniporosis per anthesin horizontalibus connectivo antice inappendiculato postice infra loculorum medium umbonato basi in calcar crassiusculum producto filamento medio antice affixo, ovario 4-loculare multiovulato, stylo glabro filiformi stamina longe superante, bacca alba carnosa compressa lateribus concavis.

Habitat.—Solomon Islands: Ysabal, *R. B. Comins*, 290.

Folia cum petiolo pollicari ad poll. longa et 2½ poll. lata. *Pedicelli* 3–6 lin. longi. *Petala* 5–6 lin. longa. *Bacca* parva (matura non visa) circiter 2 lin. diametro.

The stamens of this species differ materially from the typical stamen of the genus, and also from the deviations therefrom that have come under observation. In the present species the connective is thickened below the middle of the anther-cells and produced below their base in a rather thick, pointed spur, curved backwards and upwards, with the filament attached to its middle on the anterior side. The fruit, judging from somewhat imperfect material, it is true, appears to be of an unusual shape, being laterally compressed with concave sides. *Medinilla radicans*, Blume (*Rumphia*, i. p. 15. t. 3), agrees in having the connective distinctly produced below the anther-cells, but there the similarity ends.

RUBIACEÆ.

Timonius Forsteri, DC.—This curious tree is confined to Polynesia, where it inhabits the smaller islands. The localities known are; Torres Island; Romanzoff, in the Marshall Group; Vavau, Lifuka, and Savage Islands, in the Navigator's or Friendly Group; Palmerston, in the Hervey or Cook Group; Tahiti and Borabora, in the Society Group; and Bow Island, in the Low Archipelago. It varies very much in

foliage, and the specimens from Palmerston Island have thick almost fleshy branches, due probably to the presence of guano. Two very different looking Fijian trees are referred to the same genus.

Habitat.—Torres Islands, *Comins*, 311.

EBENACEÆ.

Diospyros acris, *Hemsl.;* arbor ad 40 ped. alta (*Comins*), præter pedicellos et flores pubescentes glabra, ramulis floriferis gracilibus lævibus viridibus, internodiis quam folia brevioribus, foliis alternis petiolatis coriaceis oblongo-lanceolatis obtusis vel interdum rotundatis basi subcuneatis supra subnitidis subtus pallidioribus venis primariis inconspicuis, floribus eburneis (*Comins*) mediocribus polygamis vel monoicis ♀ solitariis (an semper) ♂ vel hermaphroditis ternis, pedunculis pedicellisque brevibus, calycis fructiferi lobis 4 lignosis rotundatis deflexis marginibus reflexis, tubo annulo interno elevato instructo, corolla crassa coriacea sericeo-pubescente anguste urceolata, lobis tubo brevioribus demum recurvis obtusissimis, staminibus circiter 16 plus minus fasciculatis inæqualibus glabris, ovario hirsuto 8-loculari, loculis uniovulatis, fructu depresso-globoso, seminibus brunneis oblique oblongis compressis plano-convexis albumine æquabili densissime corneo.

Habitat.—Torres Islands, *Comins*, 312.

Folia 2–5 poll. longa; petiolus 2–3 lin. longus. *Pedunculi* 2–4 lin. longi, pedicellis brevioribus. *Calyx* fructifer circiter 1 poll. diametro. *Corolla* 5–6 lin. longa. *Fructus* circiter 15 lin. diametro. *Semina* 6–7 lin. longa.

Mr. Comins states that this tree has an acrid juice which blisters the body when applied to it.

APOCYNACEÆ.

Tabernæmontana anguinea, *Hemsl.;* arbor ad 20 ped. alta (*Comins*) undique glaberima, ramulis floriferis crassiusculis, foliis longe petiolatis oblongo-lanceolatis abrupte acuminatis basi cuneatis, venis primariis lateralibus utrinque 6–8 arcuatis excurrentibus, cymis parvis paucifloris axillaribus vel pseudo-terminalibus, floribus albis mediocribus breviter pedicellatis, calyce parvo breviter 5-dentato, dentibus deltoideis vix acutis, corollæ hypocraterimorphæ lobis valde obliquis sinistrorsum obtegentibus dextrorsum tortis undulato-crispatis, folliculis rubro-aurantiacis (*Comins*) elongatis cylindrico-clavatis supra medium seminiferis bis dextrorsum tortis, seminibus oblongis compressis rugosis.—*Hook. Ic. Pl.* t. 2397.

Habitat.—Solomon Islands: San Cristoval, *R. B. Comins*, 83.

Arbor 20-pedalis. *Folia* ramorum floriferorum cum petiolo 5–7 poll. longa et usque ad 2 poll. lata, petiolo 1–1½ poll. longa. *Cymæ* 2–3 poll. longæ, pedicellis circiter 3 lin. longis. *Flores* 10–12 lin. longi et lati. *Folliculi* 6–8 poll. longi, et supra medium siccitate 6 lin. diametro. *Semina* circiter semipollicaria.

Much elongated, twisted follicles are characteristic of this species; and from what Mr. Comins says about them, this is their normal form.

ASCLEPIADEÆ.

Tylophora sp.—Fruit is wanting to complete this apparently undescribed species.

Habitat.—Torres Islands, *Comins*, 309.

Dischidia Milnei, *Hemsl.*—Specimen in fruit. Folliculi angusti, recti, bipollicares.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 165.

GESNERACEÆ.

Cyrtandra Cominsii, *Hemsl.*; frutex usque ad 6 ped. altus, foliis alternis (*Comins*) sed potius altero abortivo quasi alternis breviter petiolatis papyraceis late ovatis acutis basi rotundatis serrulato-denticulatis supra subnitidis secus venas strigillosis inter venas parcissime strigillosis subtus pallidis secus venas præcipue pubescentibus, floribus mediocribus umbellatim cymosis, cymis graciliter pedunculatis, pedunculis pedicellisque filiformibus ferrugineo-pubescentibus, bracteis bracteolisque parvis vel minutis cito deciduis, sepalis fere liberis inæqualibus oblongo-lanceolatis apiculatis corollæ tubum fere æquantibus, corolla glabra leviter oblique hypocraterimorpha, tubo leviter curvato, limbo fere æqualiter 5-lobato lobis brevibus rotundatis, genitalibus inclusis, filamentis filiformibus glabris antheris approximatis, ovario glabro, bacca carnosa succosa fere fusiformi.

Habitat.—Santa Maria, Banks Islands, *Comins*, 288.

Frutex 6-pedalis. *Folia* (2 tantum visa) circiter 7 poll. longa et 3½–4 poll. lata. *Cymæ* circiter 2 poll. diametro. *Pedunculi* (an perfecti ?) 1½–2 poll. longi. *Pedicelli* 2–3 lineas longi. *Corolla* 6–7 lin. longa, limbo circiter 4 lin. diametro. *Bacca* circiter 6 lin. longa.

Mr. Comins describes the calyx as white, he corolla yellow.

MONIMIACEÆ.

Hedycarya solomonensis, *Hemsl.*; frutex usque ad 12 ped. altus (*Comins*), undique glaber, cortice pallido, foliis breviter petiolatis tenuibus papyraceis vel fere membranaceis oblongo-lanceolatis acutis basi subcuneatis subtus pallidis venis primariis lateralibus utrinque circiter 5 distantibus longe intra marginem inter se arcuatim connexis, floribus non visis (axillaribus, *Comins*), carpellis nigris (*Comins* longe stipitatis globosis ovoideis, stipitibus crassis rubro-aurantiacis insignis (*Comins*), receptaculo irregulari pedunculato.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 257.

Frutex 12-pedalis. *Folia* 6–8 poll. longa et 2½–3½ poll. lata, petiolo 3–4 lin. longo. *Pedunculus* unicus imperfectus visus circiter pollicaris. *Stipites* 3–5 lin. longi. *Carpella* 6–8 lin. diametro.

Mr. Comins describes this as a very conspicuous and striking shrub with black berries borne on orange-red stalks.

EUPHORBIACEÆ.

Daphniphyllum ? conglutinosum, *Hemsl.*; arbor magna (*Comins*) undique glabra, ramulis crassiusculis, foliis longe petiolatis subcoriaceis ovato-lanceolatis vel late ellipticis subito caudato-acuminatis acutis basi

rotundatis vel interdum subcuneatis paucicrenatis vel obscure lobulatis, venis primariis lateralibus utrinque 7–10 subtus sat conspicuis, floribus ♀ . . . floribus ♂ racemosis, racemis axillaribus rigidis paucifloris quam folia brevioribus, pedicellis brevibus basi bractea minuta squamiformi subtentis, calyce bivalvi sepalis crassis subcarnosis, margine scarioso, latis rotundatis appressis, staminibus numerosis filamentis brevissimis antheris magnis exsertis, drupa abortu unisperma obovato-oblonga basi calyce parvo irregulariter 5-lobato suffulta apice stylopodio lato crasso coronata, endocarpio tenui, mesocarpio crasso dense spongioso succo viscoso impleto, epicarpio tenui coriaceo, semine maturo non viso.

Habitat.—San Cristoval, Solomon Islands, *Comins*, 75.

Folia maxima cum petiolo 9 poll. longa, petiolo 2 poll longo; folia minora 3–4 poll. longa. *Racemi* 1½–3½ poll. longi. *Pedicelli* 1–2 lin. longi. *Flores* ♂ 2–3 lineas diametro. *Drupa* 1 poll. longa et 6 lin. crassa.

Mr. Comins's note on this tree follows :—

"Large tree in bush; leaves alternate; flowers small, yellow. Fruit size of an almond, the skin covering a soft white substance like india rubber, within which is one seed."

He also states that the sap is the strongest cement known to the natives, and is used by them for mending shell armlets, &c. Further, that it is really equal, if not superior, to diamond and other prepared cements, and is used when they fail to hold.

With regard to the genus there is some doubt, but it has been described, so far as the material will permit, on account of its economic value, and because Mr. Comins has taken the trouble to collect such specimens as he could on two occasions.

LILIACEÆ.

Smilax utilis, *Wright*; fruticosa, caule scandente tereti vel leviter striato, foliis oblongis apice acuminatis basi acutis trinerviis nitidis subcoriaceis, floribus pluribus umbellatis, masculis perianthii segmentis ligulatis reflexis marginibus hyalinis, staminibus 6 antheris brevibus albis, femineis non visis, bacca globosa trisperma, seminibus plano-convexis levibus.

Habitat.—San Cristoval and Malaita, Solomon Islands. *Comins*, 97 and 297.

Folia 2½–3½ poll. longa, 1¼ poll. lata; *petiolus* 6 lin. longus. *Pedunculus* 1 poll. longus; *pedicelli* 5 lin. longi. *Perianthii* segmenta 2 lin. longa. *Bacca* 4 lin. diam.

This is most nearly related to *Smilax indica*, Vitm., from which it differs in having much narrower, shining leaves. The stems are used to tie fences.

ORCHIDEÆ.

Bulbophyllum Cominsii, *Rolfe*; rhizomate repente valido, pseudobulbis ovatis monophyllis, foliis oblongis obtusis basi attenuatis coriaceis, scapis unifloris, bracteis elliptico-lanceolatis subacutis basi tubulosis, sepalo postico ovato-oblongo obtuso subundulato lateralibus connatis postico similibus, petalis minutis triangulato-ovatis acutis, labello parvo

lateraliter compresso angusto basi sublato margine ciliato, columna brevissima dentibus brevibus acutis.

Habitat.—Florida, Solomon Islands, *Comins*, 289.

Pseudobulbi 8–9 lin. longi. *Folia* 4½–5 poll. longa, 1–1½ poll. lata. *Scapi* 4–5 poll. longi. *Bracteæ* 8–9 lin longæ. *Sepalum* posticum 2¾ poll. longum, 16 lin. latum, lateralia 2¼ poll. longa, 15 lin. lata. *Petala* 1 lin. longa. *Labellum* 3 lin. longum. *Columna* 2 lin. longa.

A remarkable species allied to *Bulbophyllum grandiflorum*, Blume, and *B. longisepalum*, Rolfe, though with the lateral sepals united into a single organ, like the dorsal sepal in shape but rather smaller. It has the habit and general appearance of the former, but, in addition to the character just pointed out, it has considerably smaller flowers. The collector describes the flowers as purple with white spots.

Appendicula Vieillardii, Reichb. f.—Previously collected in New Caledonia and the island of Aneitum, New Hebrides.

Habitat.—Malaita, Solomon Islands, *Comins*, 296.

" An epiphyte on trees on the sea-beach."

CCCCLXII.—SIAM GAMBOGE.

(*Garcinia Hanburyi*, Hook. f.)

The tree yielding Siam Gamboge (*Garcinia Hanburyi*, Hook. f.) is closely related to *G. Morella*, Desrouss, of Ceylon and Southern India. The former is a moderately large tree. The flowers are diœcious, the petals in both male and female flowers are fleshy and yellow. The fruit is the size of a crab-apple, yellowish-green when ripe. The tree is found on islands on the east coast of the Gulf of Siam, as well as on the mainland of Cambodia and Cochin-China. It is from these localities that practically the whole of the Gamboge of commerce is obtained. Gamboge is a gum resin yielded by the bark of the two species above mentioned. It is a powerful cathartic medicine, but its principal use is as a pigment in water-colour painting. It is also used to give colour to lacquer varnish for brass work, &c. The most recent account of Siam Gamboge is contained in a report on the trade of Siam for the year 1893, published by the Foreign Office (Annual Reports, 1895), No. 1520. Mr. de Bunsen, Her Majesty's *Chargé d'Affaires* at Bangkok, was good enough to communicate to Kew specimens of the leaves of the Gamboge trees collected on the spot by Mr. Beckett, and, although the material is not quite complete, there is little doubt they belong to *Garcinia Hanburyi*, Hook. f. The extract from the report is as follows :—

" *Gamboge* is, next to gum-benjamin, perhaps, the most interesting of Siamese products. Whilst gum-benjamin is peculiar to a small belt of land in the north, gamboge is a resinous product indigenous only in the islands and the sea coast of the Gulf of Siam, lying between the 10th and 12th degrees of north latitude.* I recently had the opportunity of paying a visit to this part of Siam, and it may be of interest to describe the character of the tree and the mode of extracting the resin. The tree is known locally as 'Ton Rong.' It is found only in the islands of Koh Chang, Koh Kong, and Koh Rong, and the mainland of the Indo-Chinese Peninsula opposite these islands. The trees grow to the height of some 50 feet, and are straight-stemmed with no lower branches, owing probably to the dense shade of the forest in which they grow. None of those I saw had a diameter of more than 12 inches. Ten years' growth is said to be required before the tree is ready for tapping. This is carried on by the Cambodian and Siamese islanders in the rainy months from June to October, when the sap is vigorous, by cutting a spiral line round the trunk from a height of some 10 feet downwards to the ground. Down these grooves the resin wells out of the bark and trickles in a viscous stream into hollow bamboos placed at the base of the tree, and from these it is decanted into smaller bamboos, where it is left for about one month to solidify. To remove the gamboge the bamboo is placed over a red-hot fire, and the bamboo husk cracking off, there is left the article known as 'pipe' gamboge. The trees can be tapped two or three times during one season, and at the end of the season their trunks present a curious network of intersecting spirals. Care must be taken to prevent the rain-water mixing with the resin in the grooves, as any mixture of water causes honey-combing and black discolouration, and a consequent depreciation of from 20 to 30 ticals (2*l.*) per picul in value. The most valuable gamboge is that which is the least honey-combed or discoloured, and is all the more difficult to obtain, considering the period of heavy rains during which the resin is extracted. The bamboos contain on an average rather less than 1 lb. of gamboge, or about 170 bamboos to the picul. The price asked by the pickers themselves is at the rate of 2 ticals (3*s.*) for five bamboos full, and the local price is at the rate of 2 ticals (3*s.*) for three, or 65 ticals (4*l.* 18*s.*) per hundred, or about 8*l.* 7*s.* per picul. The whole output is sold to local Chinese traders and taken by sailing boat to Bangkok."

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* The heavy rainfall of this coast seems necessary to the existence of the tree.

CCCCLXIII.—IPOH POISON.

(Supplementary Note.)

The *Kew Bulletin* for 1891 (pp. 259–268) contains an article summarising the information which had been obtained as to the Ipoh poison of the Malay Peninsula.

In a communication from Mr. L. Wray jun, Curator, Perak Government Museum, it was stated that while the Sakais living in the plains employ the *Antiaris* poison, the Sakais of the hills use a poison prepared from three hill plants called *ipoh aker*, *prual*, and *lampong*.

Further material has now been received from Mr. Wray which throws additional light on the identity of two of these plants. Dr. Stapf has accordingly, in the following notes, been able to revise his determinations:—

Ipoh Aker was stated (l.c. p. 267) to be "closely allied to *Strychnos Maingayi*, and probably only a different state of it." The copious material which I have now before me of *Strychnos Maingayi* as well as of the *Ipoh Aker* plant, renders it evident that the latter is not *S. Maingayi*, although probably a close congener. It differs from *S. Maingayi* in the almost papery leaves which are very like those of

S. wallichiana, Benth., and in the glabrous ovary. It is probably a new species; but I cannot describe it in the absence of flowers.

Prual was determined to belong to the natural order *Rubiaceæ;* but as the material then at hand consisted only of a young barren branch it was impossible to go beyond the vague suggestion that it might be a species of *Urophyllum* or *Lasianthus*, certain species of which exhibit a great similarity of habit. The correctness of the determination of *Prual* as a Rubiacea was called in question by Mr. Holmes and Professor Radlkofer (*Pharmaceutical Journal*, 1894, p. 620); yet a repeated examination of the material confirmed me in my opinion as to the systematic affinity of the plant (*Pharmaceutical Journal*, 1894, p. 660). From the material now at hand it appears that the plant is *Coptosapelta flavescens*, Korth., a Rubiacea of the *Cinchona* group. The genus *Coptosapelta* comprises at present two described species, *C. flavescens*, Korth., and *C. Griffithii*, Hook. fil., to which, however, several more might be added from the material preserved at Kew. The genus extends from the Malay Peninsula to the Philippines and New Guinea. *C. flavescens* ranges from the Malay Peninsula and Sumatra to Java and Borneo; *C. Griffithii* is limited to the southern part of the Malay Peninsula, and other species still undescribed were collected in Penang, Java, Sarawak, Luzon, and New Guinea. *Coptosapelta* is, beside *Hymenodictyon*, its nearest ally, the only representative of the subtribe *Eucinchoneæ* in Malaya; the remainder being mostly natives of tropical America and extra-tropical South America.

A small quantity of the root bark of *Prual*, from Perak, was examined by Dr. Ralph Stockman with respect to its physiological action on animals, and a short account of the results was published by him in the *Pharmaceutical Journal*, 1894, p. 561. If this root bark was actually derived from the same plant from which the herbarium specimens communicated by Mr. L. Wray as *Prual* were cut, then *Coptosapelta* must be counted in future among the poisonous plants. Up to the present, however, *Coptosapelta* was not known to possess poisonous or otherwise prominent chemical properties. But it may be mentioned that *Hymenodictyon excelsum*, Wall., an allied plant, and a native of India, yields an alkaloid "Hymenodictyonine," the chemical properties of which "display a close analogy with those of nicotine" (Watt, *Dict. Econ. Prod. India*, iv., 319), and the inner bark of this plant has been long employed by the Hindoos as a febrifuge and antiperiodic.

In the *Kew Bulletin* (1891, p. 264) reference was made to other ingredients sometimes mixed with the Ipoh by the Semangs. One of these was *likir*, an Aroid sent by Mr. Wray to the Calcutta Botanical Gardens for identification. It has now been ascertained there to be *Amorphophallus Prainii*, Hook. f.

CCCCLXIV.—DIAGNOSES AFRICANÆ, VI.

(*Continued from p.* 99.)

The following descriptions were originally intended for the *Decades Kewenses*, consequently they are not quite uniform with the preceding descriptions under this head, being rather more detailed. Six of them were communicated by Mr. E. E. Galpin, of Queenstown, Cape Colony, and these are drawn up on a somewhat different plan; but it was not considered desirable to alter them, beyond converting the metrical

measurements into inches and lines or twelfths of an inch. They relate to plants of exceptional interest, either on account of their beauty or their distribution.

217. Aphloia myrtiflora, *Galpin* [Bixineæ]; arbuscula 20-pedalis, ramulis divaricatis flexuosis; folia oblongo-elliptica, leviter acuminata, serrulata, glabra, 2–2¼ poll. longa, 6–8½ lin. lata, petiolis circa 1½ lin. longis; flores axillares, solitarii, sepala persistentia, petaloidea, alba, alte 5-fida, lobis convexis reflexis irregulariter imbricatis ovatis acutis vel obtusis 4½–5 lin expansis; pedicelli 6–8 lin. longi, 2–3 minutas squamiformes bracteas et unam majorem sub petaloideam proxime calycem ferentes; ovarium album, oblongo-fusinum; bacca obovoidea, alba, circa 3 lin. longa, 2 lin. lata, 2-sperma, semina reniformia.

Habitat.—Transvaal: in woods on the summit of Upper Moodies Mountain, Barberton. Alt. 4600 ft. October, 1890, *Galpin*, No. 1082.

218. **Polygala producta**, *N.E. Brown* [Polygalaceæ]; herbacea basi lignosa, caulibus subangulosis minutissime puberulis erectis, foliis alternis brevissime petiolatis adscendentibus linearibus obtusis vel acutis glabris, racemis terminalibus solitariis elongatis laxe multifloris, bracteis lanceolato-subulatis caducis, pedicellis brevibus recurvis glabris, sepalis exterioribus subæqualibus 2 inferioribus connatis cymbiformibus, alis ellipticis obtusis trinervis viridibus, petalis lateralibus carinam æquantibus integris late spathulalo-obovatis obtusissimis purpureis, carina purpurea integra infra apicem cristata, capsulis oblongis emarginatis glabris, seminibus sericeo-pubescentibus.

Habitat.—Transvaal: Barberton, in grassy places at Highland Creek, 3000 feet, March, *Galpin*, 844; Pretoria, *Rehmann*, 4565; *Mc Lea* in Herb. *Bolus*, 3142; Magalisberg, *Burke*, 374; Apies River, *Nelson*, 281; Griqualand East, rough slopes near Umzimkulu River, 2500 feet, March, *Tyson*, 2741, and *Herb. Norm. Austr. Afr.*, 883. Natal: *Gerrard*, 46,1781; Inanda Krantzkloof, *Wood*, 1171; Weenen County, *Southerland.*

Caules 7–24 poll. alti. *Folia* 6–15 lin. longa, 1–2 lin. lata: *Racemi* 3–12 poll. longi. *Bracteæ* 1–1½ lin. longæ. *Pedicelli*, 1½ lin. longi. *Sepala* exteriora 1–1½ lin. longa. *Alæ* 2–3 lin. longæ, 1¼–1¾ lin. lata. *Petala* 2¼–4 lin. longæ. *Carina* 2–3½ lin. longa.

219. **Dombeya pulchra**, *N. E. Brown* [Sterculiaceæ]; frutex ramis petiolis pedunculis pedicellisque plus minusve villoso-tomentosis, stipulis falcato-ovatis acutis vel acuminatis, foliis longe petiolatis rotundatis apice trilobis basi cordatis supra velutinis viridibus subtus dense velutino-tomentosis albis, cymis longe pedunculatis axillaribus solitariis 10–15 floris, pedicellis apice bibracteatis, bracteis ovatis acutis deciduis cum sepalis lanceolatis acuminatis reflexis velutino-tementosis, corolla magna petalis oblique rhomboideis truncatis albis basi purpureis glabris, staminodiis lineari-spathulatis quam stamina duplo longioribus albis basi purpureis.

Habitat.—Transvaal: Rimers Creek, Barberton, 3000–3500 feet February, *Galpin*, 804.

Frutex 5–8 ped. altus. *Foliorum petioli* 4–6½ poll. longi, laminæ 4–7½ longæ et latæ. *Stipulæ* 4–12 lin. longæ, 1½–3½ lin. latæ. *Pedunculi* 4–6 poll. longi. *Pedicelli* 7–15 lin. longi. *Bracteæ* 3½–7 lin. longæ, 2½–4 lin. latæ. *Sepala* 6 lin. longa, 1½ lin. lata. *Corolla* 1½–1¾ poll. diam. *Petala* 8–9 lin. longa, 7–8 lin. lata. *Staminodia* 6–7 lin. longa, apice ¾–1 lin. lata.

220. **Hermannia montana,** *N. E. Brown* [Sterculiaceæ]; humilis suffruticosa basi ramosa, ramis erectis simplicibus dense stellato-tomentosis fulvidis, foliis breviter petiolatis adscendentibus lineari-oblongis vel inferioribus oblingis utrinque acutis integris vel leviter crenulatis in siccis complicatis dense stellato-tomentosis subvelutinis subtus fulvidis, stipulis erectis lanceolatis acutis stellato-tomentosis, cymis breviter pedunculatis subumbellatim 3–5-floris bracteatis, bracteis liberis vel interdum plus minusve connatis lanceolatis acutis atque pedicellis brevibus calycibusque glanduloso-tomentosis, calyce infra medium 5 loba lobis lanceolatis acutis erectis intus laxe tomentosis, petalis luteis obovatis unguibus pubescentibus canaliculatis, staminibus quam petala multo brevioribus, filamentis linearibus pubescentibus supra medium truncato-cuspidatis vix vel non dilatatis, ovario tomentoso.

Habitat.—Transvaal: upper slopes of the Saddleback Range near Barberton, 4000-5000 feet, February, *Galpin*, 831.

Planta 5–7 poll. alta. *Foliorum petioli* 1–3 poll. longi, laminæ 1¼–2½ poll. longæ, 2–7 lin. latæ. *Stipulæ* 3–5 lin. longæ, ¾–1 lin. latæ. *Pedunculi* 2 lin. longi. *Bracteæ* 3–4 lin. longæ, 1–1½ lin. latæ. *Calyx* 3 lin. longus, lobi 1 lin. lati. *Petala* 3½–4 lin. longa, 1½–2 lin. lata. *Filamenta* 1½–2 lin. longa. *Antheræ* 1½–2 lin. longæ.

221. **Hermannia grandifolia,** *N. E. Brown* [Sterculiaceæ]; caulibus elongatis ramosis flexuosis pilis stellatis stipitatis asperis, foliis petiolatis elongato-cordato-ovatis acutis vel obtusis supra sparse stellato-scaberulis subtus molliter stellato-tomentosis, stipulis magnis patentibus vel reflexis latissime ovatis vel subrotundatis dentatis acutis stellato-pubescentibus, floribus anguste paniculatis, pedunculis bifloris, bracteis connatis bifidis cum pedicellis inæqualibus calycibusque glanduloso-tomentosis, calyce ad medium 5-lobato intus pubescente, petalis oblanceolato-obovatis obtusis utrinque pubescentibus unguibus canaliculatis, staminibus quam petala multo brevioribus, filamentis linearibus stellato-pubescentibus supra medium abrupte truncato-cuspidatis vix vel non dilatatis, ovario tomentoso.

Habitat.—Transvaal: beside the stream, Great Scott valley, Barberton, 2600 feet, April, *Galpin*, 940.

Rami floriferi 6–10 poll. longi. *Foliorum caulinorum petioli* 8–9 lin. longi, laminæ 2¾–4¼ poll. longæ, 1¼–2 poll. latæ, ramorum lateralium 4–8 lin. longi, laminæ 9–18 lin. longæ, 4–10 lin. latæ. *Stipulæ* 3–6 lin. longæ et latæ. *Pedunculi* 3–5 lin. longi. *Bracteæ* 3–4 lin. longæ. *Pedicellus* inferior 1 lin. longus, superior 4–5 lin longis. *Calyx* 3 lin. longus, lobi 1 lin. lati. *Petala* 4–5 lin. longa, 1⅓–1½ lin. lata. *Filamenta* 2½ lin. longa, *Antheræ* 2 lin. longæ.

222. **Geranium pulchrum,** *N. E. Brown* [Geraniaceæ]; herbaceum perenne, caulibus erectis superne laxe ramosis patente pubescentibus glanduloso-pubescentibus, foliis petiolatis (inferioribus longissime) rotundatis ad medium vel ultra palmatim 5–7 lobatis lobis irregulariter sublobulatis et dentatis supra viridibus pubescentibus subtus dense albo-tomentosis, stipulis 3–7 partitis segmentis lineari-subulatis acuminatis pubescentibus ciliatis, pedunculis bifloris cum pedicellis bracteisque lineari-subulatis patente glanduloso-pubescentibus, floribus speciosis magnis, sepalis exterioribus lanceolato-ovatis acutis interioribus ovato-oblongis omnibus apiculatis extus glanduloso-pubescentibus, petalis latissime obovatis purpureis calyce duplo longioribus, ovario piloso, stylo glanduloso-pubescente, seminibus glabris immaturis punctatis.

Habitat.—Natal: on the Drakensberg, in swamps, 6000—7000 feet, January, *Evans*, 378.

Caules 2–2½ ped. alti. *Foliorum inferiorum petioli* 3½–8½ poll. longi, superiorum 6–18 lin. longi, laminæ 1½–3 poll. diam. *Stipulæ* 3–8 lin. longæ. *Pedunculi* 1–3 poll. longi. *Bracteæ* 3–5 lin. longæ. *Sepala* 5–6 lin. longa, 1½–2 lin. lata. *Petala* 7–10 lin. longa, 7–9 lin lata.

223. **Pelargonium dispar,** *N. E. Brown* [Geraniaceæ]; caulibus erectis simplicibus vel parce et breviter ramosis herbaceis pubescentibus vel pilosis pilis patentibus, foliis oppositis petiolatis late ovato-cordatis sublobatis obtusis lobis brevissimis obtuse rotundatis crenatis utrinque molliter pubescentibus, petiolis pilosis, stipulis ovatis vel ovato-lanceolatis acuminatis integris bifidis vel bipartitis pilosis vel glabris ciliatis, pedunculo quam petiolus longiore gracili 1–3 floro apice 2–4 bracteato piloso, bracteis lanceolatis acuminatis marginibus longe ciliatis, pedicello gracili piloso, sepalis lanceolatis acuminatis pilosis vel subglabris ciliatis, calcari elongato, petalis subæqualibus quam sepala duplo longioribus anguste oblanceolatis obtusissimis albis vel pallide roseis rubro-venosis, staminibus 7 fertilibus glabris quam petala brevioribus 3 sterilibus minutis dentiformibus, ovario glabro, stylo pubescente.

Habitat.—Natal: Drakensberg, Tiger Cave Valley, 6000–7000 feet, among grass, January, *Evans*, 371; slopes of Mount Erskine, 5000–6000 feet, January, *Evans* 403.

Caules 8–18 poll. alti. *Foliorum petioli* 2 lin.–2 poll. longi, laminæ ¾–2 poll. longæ, ¾–1¾ poll. latæ. *Stipulæ* 2–4 lin. longæ, 1–2 lin. latæ. *Pedunculi* 7–16 lin. longi. *Bracteæ* 2–2½ lin. longæ. *Pedicelli* 5–9 lin. longi. *Sepala* 3 lin. longa, ½–1 lin. lata. *Calcar* 3–5 lin. longum. *Petala* 4½–6 lin. longa, 1¼–1¾ lin. lata.

224. **Vitis succulenta,** *Galpin* [Ampelideæ]; caules crasso-carnosi ramosi, quadrangulares, glabri, virides, 9 lin. crassi, margines cartilagini rubri tincti; caules juniores 4-sulcati angulis undulatis sinuatis, in geniculis folio unico cirrho opposito; internodia 3¼–8 poll. longa; stipulæ binæ, late ovatæ, circa 2½ lin. longæ; petioli 4½ lin. longi; folia basi late cuneata vel subtruncata, trinervia, triloba, lobis dentatis acutis mucronatis, 9½–12 lin. longa, 14–16½ lin. lata; panicula ramosa, 5–8½ poll. longa; pedicelli sub umbellati summis incrassatis pedunculis, 3¾–4¼ lin. longi; calyx campanulatus, truncatus; petala 4, rosea, calyce triplo longiora, 1½ lin. longa; bacca ovoidea, mucronata, purpurea, 4¼ lin. longa, 3¾ lin. crassa, unilocularis, unisperma.

Habitat.—Transvaal: Kaap River valley near Barberton, alt. 1900–2100 feet, *Galpin*, 1177.

Stems 10–15 ft. long climbing amongst rocks on hillsides and in creeks in warm situations where sheltered by scrub. Flowers November. Fruits February.

225. **Crassula curta,** *N. E. Brown* [Crassulaceæ]; nana, perennis, basi breviter stolonifera, caule erecto simplici usque ad apicem foliati pilis albis retrorsis tecto, foliis radicalibus rosulatis oblanceolatis caulinis breviter connato-vaginatis lanceolatis acutis vel subacutis adscendentibus supra vel utrinque pilis albis pubescentibus marginibus longe ciliatis, cymis terminalibus parvis dense multifloris, bracteis lineari-oblongis vel linearibus ciliatis, pedicellis brevibus glabris, sepalis erectis lanceolatis

acuminatis glabris apice interdum scabris non ciliatis petalis subæquilongis, petalis oblongis obtusis dorso ad apicem minute calloso-apiculatis basi brevissime connatis gamopetalis albis, staminibus quam petala brevioribus antheris luteis, glandulis hypogynis subquadratis apice leviter dilatatis truncatis albis, carpellis oblique oblongis albidis, stylo brevi erecto.

Habitat.—Natal: Tabamhlope Mountain, 6000–7000 feet, February, *Evans*, 408; without locality, *Gerrard*, 1790?

Var. **rubra**, *N. E. Brown;* differt tantum floribus rubris.

Habitat.—Natal: Amawahqua Mountain at 6000–7000 feet, April, *Wood*, 4592.

Herba 1½–2½ poll. alta. *Folia* 3–5 lin. longa, 1½–2 lin. lata. *Cymæ* 5–9 lin. diam. *Bracteæ* 1½–3 lin. longæ, ¼–½ lin. latæ. *Pedicelli* 1–2 lin. longi. *Sepala* 1¼–1½ lin. longa, ½ lin. lata. *Petala* 1½ lin. longa ½ lin. lata.

226. **Crassula umbraticola**, *N. E. Brown* [Crassulaceæ]; pusilla, tuberosa, glabra, tubere pisiformi, caule erecto simplici, foliis 6–8 plerumque ad apicem caulis subconfertis oppositis petiolatis subreniformibus rotundatis vel elliptico-ovatis obtusis crenatis vel crenato-dentatis basi cuneatis, pedunculo terminali gracili cymoso-paucifloro, bracteis minutis, pedicellis gracilibus, sepalis lanceolatis acutis, petalis lanceolatis acutis quam sepala subtriplo longioribus albis, glandulis hypogynis minutis, carpellis oblique ovoideis stylis erectis coronatis.

Habitat.—Natal: Drakensberg, in caves, 6000–7000 feet, January, *Evans*, 362; without locality, *Gerrard*, 1448. Orange Free State, *Cooper*, 1084.

Planta 2½–6 poll. alta. *Tubera* 1½–2½ lin crassa. *Foliorum petioli* 1½–8 lin. longi, laminæ 3–11 lin. longæ, 4–12 lin. latæ. *Pedunculi* 6–18 lin. longi. *Pedicelli* 2–6 lin. longi. *Sepala* ½–¾ lin. longa. *Petala* 1¾–2 lin. longa, ½–⅔ lin. lata.

227. **Pavetta disarticulata**, *Galpin*, [Rubiaceæ]; frutex 8-15 pedalis glaberrimus, ramis crassis cinereis asperrimis cum cicatricibus, ramulis decussatis sub-compressis, folia petiolata, lancesolata vel oblongo-lanceolata, cuneata, punctata, acutiuscula vel acuminata, coriacea, laminis 4½–8 poll. longis, ¾–3 poll. latis, petiolis ¾–2⅓ poll. longis; stipulæ truncatæ in vaginam connatæ, 1–2-cuspidatæ; corymbi trichotomi, densi, 1¼–3 poll. longi; calyx cyathiformis, truncatus, minute dentatus, ½ lin. longus; corolla alba, tubo 4½–7 lin. longo, limbo 4½ lin. longo, stylus corollæ tubum 9½ lin. excedens; bacca virescens, 3–3½ lin. crassa.

Habitat.—Transvaal: Barberton, amongst scrub and rocks on the slopes and granite ridges surrounding the town; also Kaap river valley and French Bobs Hill, alt. 1800–2900 ft. *Galpin*, No. 406. Zululand: Indulindi, on the side of a stony hill, alt. about 1000 feet, *Wood*, 3954*a*.

228. **Anthospermum humile**, *N. E. Brown* [Rubiaceæ]; nanum suffruticosum basi ramosum, ramis erectis minute puberulis, foliis oppositis parvis adscendentibus linearibus acutis supra leviter canaliculatis glabris, stipulis connatis integris brevissime acutis, floribus dioicis vel interdum monoicis axillaribus sessilibus solitariis glabris,

calycis limbo inæqualiter 4 dentato, corollæ lobis lineari-lanceolatis acutis valde revolutis.

Habitat.—Natal: Ulundi, 5000–6000 feet, on damp rocks, January, *Evans*, 370.

Rami 1½–2 poll. longi, *Folia* 1½–5 lin. (plerumque 3 lin.) longa, ½ lin. lata. *Corollæ tubus* ½ lin. longus, lobi 1½ lin. longi, ⅓ lin. lati.

229. **Valeriana capensis**, *Thunb.* var. **lanceolata**, *N. E. Brown* [Valerianeæ]; foliis radicalibus lanceolatis vel ovato-lanceolatis obtuse acutis basi acutis rotundatis vel subcordatis integris vel plus minusve dentatis, caulinis pinnatisectis lobis lateralibus parvis lobo terminali elongato lanceolato.

Habitat.—Natal: top of Tabamhlope, 6000–7000 feet, January, *Evans*, 368. Kaffraria: Baziya Mountains 4000 feet, November, *Baur*, 546. Nyassaland: Mount Milanji, *Whyte*.

Foliorum radicalium petioli 9 lin. 4 poll. longi, laminæ 1¼–4½ poll. longæ, 6–10 lin. latæ.

230. **Felicia linearis**, *N. E. Brown* [Compositæ]; acaulis, foliis radicalibus numerosis confertis erectis linearibus obtusis succulentis glabris, scapis 1–2 inferne glabris superne pubescentibus foliis paucis parvis linearibus alternis instructis, capitulo solitario multifloro radiato, involucri bracteis subbiseriatis exterioribus linearibus obtusis interioribus multo longioribus lineari-oblongis subacutis omnibus ciliatis dorso glabris vittis aurantiaco-brunneis parvis plus minusve notatis et interdum purpureo-tinctis, floribus radii lineari-lingulatis acutis albis pallide roseis vel luteis, disci luteis, pappi setis uniseriatis minute scaberulis, achæniis immaturis compressis sparse pubescentibus.

Habitat.—Natal: top of Mount Erskine, 6000–7000 feet, January, *Evans*, 372; summit of Mount Amawahqua, 6000–7000 feet, April, *Wood*, 4631; Faku's Territory, *Sutherland*.

Folia 6 lin. 2 poll. longa, ½–1 lin. lata, *Scapi* 1–7 poll. longi. *Capitula* 9 lin. diam. *Involucri bracteæ interiores* 2½–3 lin. longæ, ¾ lin. latæ. *Corollæ radii* 3–3½ lin. longæ, disci 1½–1¾ lin. longæ.

231. **Helichrysum fulvum**, *N. E. Brown* [Compositæ]; caule elato superne paniculato-ramoso plus-minusve breviter setoso-glanduloso purpureo, foliis sessilibus amplexicaulibus subscabris glandulosis inferioribus oblanceolatis acutis deorsum longe attenuatis marginibus anguste albo-lanatis superioribus ovatis vel ovato-oblongis acutis marginibus scabris, capitulis ad apicem ramorum subconfertis circa 200–300 floris, involucri bracteis pluriseriatis brunneo-luteis subnitidis ovatis acutis interioribus quam discus subduplo longioribus radiantibus exterioribus gradatim minoribus glabris, receptaculo leviter foveolato, corolla breviter 5-dentata brunneo-lutea, pappi setis minute scabris apice leviter incrassatis, achæniis glabris.

Habitat.—Natal: Drakensberg, by streams in Tiger Cave Valley, 6000–7000 feet, January, *Evans*, 352; edge of brook near Van Reenans Pass, 5000–6000 feet, December, *Wood*, 4533.

Caules 2–3 ped. alti. *Folia inferiora* 4–5 poll. longa ½–1 poll. lata, superiora 1¼–3 poll. longa, 5–8 lin. lata. *Capitula* 6–8 lin. diam. *Involucri bracteæ interiores* 3 lin. longæ, ¾ lin. latæ. *Corollæ* 1¼–1½ lin. longæ.

232. **Senecio Evansi,** *N. E. Brown* [Compositæ]; arbuscula, caule erecto apice ramoso, ramis adscendentibus paniculatim ramulosis pubescentibus, foliis alternis lanceolatis pinnatisectis petiolatis, petiolo basi late alato amplexicauli-decurrente, lobis lateralibus anguste oblongis acutis patentibus integris terminali anguste lanceolato acuto integro vel basi plus minusve dentato vel lobulato utrinque subscabro marginibus scabris, foliis ramulorum lineari-lanceolatis amplexicaulibus acutis integris subscabris, pedunculis laxe 2–4 cephalis inferioribus axillaribus solitariis vel fasciculatis gracilibus folia subæquantibus vel brevioribus subscabrido-pubescentibus 2–3 bracteatis, bracteis linearibus vel lineari-lanceolatis, capitulis cymosis pedicellatis discoideis-25–30-floribus luteis, involucri bracteis subbiseriatis quam flores brevioribus oblongis vel elliptico-oblongis obtusis exterioribus angustioribus minute ciliatis subglabris vel dorso pilis paucis minutis, corolla tubulosa quinqueloba glabra, pappi setis scabris, achæniis saltem junioribus pubescentibus.

Habitat.—Natal: on the Drakensberg, 6000–7000 feet, January, *Evans*, 366.

Caules 10–12 ped. alti, 1½ poll. crassi. *Rami* 1½–2 ped. longi, ramuli 4–10 poll. longi. *Folia pinnatisecta* cum petiolis 1¾–4 poll. longa, 4–12 lin. lata, lobi laterales 1½–6 lin. longi, 1–2 lin. lati, lobo terminali 6–21 lin. longo, 1–4 lin. lato; folia integra 9–21 lin. longa, 1½–2 lin. lata. *Pedunculi* axillares 1–2½ poll. longi. *Pedicelli* 6 lin. 2 poll. longi. *Capitula* 4 lin. diam. *Involucri bracteæ* ⅓–2 lin. longæ, exteriores ½–¾ lin. latæ, interiores 1–1½ lin. latæ. *Corolla* 2 lin. longa.

233. **Euryops pedunculatus,** *N. E. Brown* [Compositæ]; frutex caule robusto apice ramoso, ramis simplicibus vel verticillatim triramulosis glabris apice sparse lanatis, foliis alternis plerumque trilobis lobis alternis linearibus subcarnosis acutis interdum bilobis vel integris linearibus glabris, pedunculis quam folia 3–4-plo longioribus terminalibus glabris, capitulis radiatis multifloris, involucri bracteis 10–12 ovatis vel ovato-oblongis acutis glabris, receptaculo denticulato, floribus radii apice minute tridentatis luteis, floribus disci campanulato-tubulosis basi angustatis, ovariis breviter albo-lanatis, pappi setis brevibus deciduis.

Habitat.—Natal: Olivers Hoek Pass, 4500 feet, January, *Wood*, 3601; top of Alatikulu Hill, 6000–7000 feet. January, *Evans*, 397. Orange Free State: without locality, *Cooper*, 2522. Transvaal: Houtbosh, *Rehmann*, 6133.

Caulis 2–3 ped. altus. *Rami* 8–12 poll. longi. *Folia* 1½–3 poll. longa, lobi ¾–1¾ poll. longi, ⅓–½ lin. lati. *Pedunculi* 6–10½ poll. longi. *Capitula* 9–10 lin. diam. *Involucri squamæ* 3–3½ lin. longæ, 1–1½ lin. latæ. *Corollæ radii* 5 lin. longæ, 1 lin. latæ, disci 1½–2 lin. longæ.

234. **Lactuca (Scariola) stenocephala,** *Baker* [Compositæ]; perennis, caulibus cæspitosis erectis ramosis, foliis radicalibus evanescentibus caulinis reductis linearibus, capitulis 5-floris in paniculam laxam corymbosam dispositis, pedunculis strictis elongatis, involucro cylindrico glabro, bracteis biseriatis exterioribus parvis ovatis interioribus 5 linearibus obtusis æqualibus viridibus, achænio cylindrico haud rostrato, pappo albo copioso achænio duplo longiore.

Habitat.—Interior of Western Lagos, *Dr. Rowland*.

Caulis 6–9 poll. longus. *Involucrum* 8–9 lin. longum. *Achænia* 3 lin. longa. *Pappus* 6 lin. longus.

235. **Lactuca (Brachyramphus) holophylla**, *Baker* [Compositæ]; erecta, perennis, foliis inferioribus fasciculatis lanceolatis integris sessilibus amplexicaulibus superioribus reductis basi sagittatis, caulibus teretibus gracilibus elongatis tenuiter pubescentibus, capitulis paucifloris in paniculam magnam laxissimam dispositis, involucro cylindrico, bracteis biseriatis exterioribus parvis interioribus 8 lanceolatis æqualibus viridibus glabris, achæniis brevibus castaneis in rostrum sensim angustatis, pappo albo molli.

Habitat.—Interior of Central Lagos, *Dr. Rowland.*

Caulis bipedalis. *Folia* inferiora 3–4 poll. longa, 3–4 lin. lata. *Involucrum* 6 lin. longum. *Achænium* 3 lin. longum, cum rostro 1½ lin. longo. *Pappus* 3 lin. longus.

236. **Wahlenbergia pinifolia**, *N.E. Brown* [Campanulaceæ]; perennis basi ramosa, caulibus erectis simplicibus, foliis densissime confertis patentibus semitereto-subulatis supra canaliculatis calloso-acutis glabris, floribus axillaribus erectis pedicellatis ad apicem caulis dense confertis, pedicellis 2–3-bracteatis pubescentibus, bracteis foliis conformibus ciliatis, calycis lobis 5 subulatis ciliatis quam tubus subhemisphæricus subtriplo longioribus, corolla campanulato-infundibuliformi breviter 5-loba glabra cærulea, filamentis basi dilatatis, ovario triloculari.

Habitat.—Natal: Weenen County at waterfall No. 7, on damp rocks, 5000–6000 feet, February, *Evans*, 348.

Caules 2½–6 poll. alti. *Folia* 4–9 lin. longa, ¼ lin. lata. *Pedicelli* 1–2 lin. longi. *Calycis lobi* 2½ lin. longi. *Corolla* 4½–5 lin. longa, 4 lin. diam.

237. **Erica Barbertona**, *Galpin* [Ericaceæ]; caules numerosi e rhizomate perenne annui, erecti, virgati, parce incani, brunnei, 3½–6 poll. alti; folia 4na, imbricata, linearia, obtusa, marginibus revolutis supra convexa, subtus, sulcata, glabra, rigide glanduloso-ciliata, cum petiolis parum ½ lin. longis, circa 2½ lin. longa; internodia 1½–2 lin. longa; flores terminales, umbellati, erecti, umbellis 3–6-floris; pedicelli calycibus paullo breviores, viscoso-pubescentes; bracteæ 2 (vel 3 ?) foliaceæ, obovatæ vel ovatæ, acutæ, ciliatæ, subremotæ; sepala inæqualia, lanceolata, acuta, rosea, setis rigidis glanduliferis obtecta; corolla calyce 4 plo longior, circa 4–4½ lin. longa, tubulosa, chartacea, rosea, extus dense viscoso-pubescens, ore aperto, limbo parvissimo ultra roseo, lobis reflexis late obtusis; genitalia inclusa, anthera basifixa, oblongo-lanceolata, glabra, biaristulata, aristis nudis subulatis; filamenta filiformia; stylus filamentis duplo longior, puberulus, filiformis, stigmate peltato; ovarium globosum, dense hirsutum.

Habitat.—Transvaal: Barberton, growing in tufts amongst stones and rocks in dry places on mountain summits, Upper Moodies and Saddleback Mountains, alt. 4500–5100 feet, September, *Galpin*, 598.

238. **Mimusops densiflora**, *Baker* [Sapotaceæ]; arborea, ramulis gracilibus glabris, foliis breviter petiolatis oblongis obtusis basi cuneatis magnis subcoriaceis utrinque viridibus glabris, cymis multifloris sessilibus confertis, pedicellis flore longioribus pubescentibus, calycis segmentis 6 ovatis æquilongis exterioribus subcariaceis ferrugineo-pubescentibus interioribus tenuioribus incanis, corollæ tubo brevissimo lobis oblongis calyce æquilongis, staminibus calyce æquilongis, ovario pubescente, stylo elongato glabro calyce longiore.

Habitat.—Interior of Western Lagos on Mount Ado, *Dr. Rowland.*

Folia, 4–6 poll. longa, 2–2½ poll. lata. *Calyx* et *corolla* 2 lin. longa. *Fructus* ignotus.

239. **Mimusops pachyclada,** *Baker* [Sapotaceæ]; arborea, foliis floribusque ad apicem ramorum crassorum aggregatis, foliis longe petiolatis anguste oblongis obtusis basi cuneatis rigide coriaceis adultis utrinque viridibus glabris junioribus pubescentibus venis primariis crebris subpatulis parallelis, floribus 8–meris, pedicellis pubescentibus flore 2–3–plo longioribus, calycis segmentis exterioribus ovato-oblongis dense brunneo-pubescentibus, corollæ tubo brevissimo lobis oblongis calyce paulo longioribus, staminibus calyce æquilongis, stylo protruso.

Habitat.—Savannahs of the interior of Western Lagos, *Dr. Rowland.*

Folia 4–5 poll. longa, 15–18 lin. lata. *Calyx* et *corolla* 3 lin. longa. *Fructus* ignotus.

240. **Mimusops capitata,** *Baker* [Sapotaceæ]; arborea, foliis floribusque ad apicem ramorum crassorum aggregatis, foliis longe petiolatis oblongis obtusis basi rotundatis rigide coriaceis utrinque viridibus glabris venis primariis prominentibus erecto-patentibus ad marginem parallelis, floribus 6-meris pluribus confertis capitatis, pedicellis dense pubescentibus flore longioribus, calycis segmentis ovatis æquilongis exterioribus dense brunneo-pubescentibus, corollæ tubo brevissimo lobis oblongis calyce æquilongis, staminibus calyce æquilongis, stylo exserto.

Habitat.—Interior of Western Lagos, *Dr. Rowland.*

Folia 6–7 poll. longa, 2½–3 poll. lata; petiolus 3–4 poll. longus. *Calyx* et *corolla* 3 lin. longa. *Fructus* ignotus.

241. **Mimusops longipes,** *Baker* [Sapotaceæ]; arborea, ramulis dense pubescentibus, foliis distincte petiolatis magnis oblongis acutis basi cuneatis subcoriaceis utrinque viridibus glabris cymis axillaribus sessilibus 3–6-floris, pedicellis flore longioribus dense pubescentibus, calycis segmentis 8 lanceolatis, exterioribus subcoriaceis dense pubescentibus incanis, corollæ tubo brevi lobis linearibus ex calyce haud protrusis, ovario dense piloso, stylo glabro elongato.

Habitat.—Interior of Western Lagos, *Dr. Rowland.*

Folia 4–6 poll. longa, medio 2–2½ poll. lata, petiolo pollicari. *Calyx* et *corolla* 4½–5 lin. longa. *Fructus* ignotus.

242. **Schizoglossum elingue,** *N.E. Brown* [Asclepiadeæ]; nanum, caulibus erectis patente pubescentibus, foliis 10–20 oppositis petiolatis quam internodia duplo longioribus oblongis subacutis vel obtusis basi subtruncatis levissime subauriculatis vel obtuse rotundatis utrinque pubescentibus marginibus revolutis, umbellis pedunculatis 4–8 floris, 1–3 ad apicem caulis corymbosis, pedunculis quam folia brevioribus, bracteis subulatis, pedicellis brevibus sepalisque lanceolatis acuminatis patente pubescentibus, corolla fere ad basin 5–loba lobis oblongis subobtusis albis breviter ciliatis extus marginibus sparse pubescentibus intus dense pubescentibus, coronæ lobis quam columna staminum duplo longioribus planis ovato-oblongis basi subcordatis vel truncato-rotundatis erectis apice recurvis 2–3 dentatis intus edentatis et ecarinatis albis.

Habitat.—Natal: on the slopes of the Drakensberg, 6000–7000 feet, January, *Evans,* 358.

Caules 3–6 poll. alti. *Foliorum petioli* 1–$2\frac{1}{2}$ lin. longi, laminæ $\frac{3}{4}$–2 poll. longæ, $2\frac{1}{2}$–8 lin. latæ. *Pedunculi* 3–9 lin. longi. *Bracteæ* $1\frac{1}{3}$–4 lin. longæ. *Pedicelli* 2–$3\frac{1}{2}$ lin longi. *Sepala* 2–$3\frac{1}{2}$ lin. longa, $\frac{2}{3}$–$\frac{3}{4}$ lin. lata. *Corollæ lobi* $3\frac{1}{2}$–4 lin. longi, $1\frac{1}{3}$–$1\frac{3}{4}$ lin lati. *Coronæ lobi* 2–$2\frac{1}{3}$ lin. longi, basi 1 lin. lati, apice $\frac{1}{2}$ lin. lati.

243. **Anisotoma pedunculata,** *N. E. Brown* [Asclepiadeæ]; undique pilis articulatis vestita, caule diffuso vel subscandente, foliis petiolatis cordatis vel rotundato-cordatis obtusis, cymis umbelliformibus 3–9-floris pedunculatis, bracteis parvis subulatis, pedicellis elongatis gracilibus, sepalis lanceolatis acutis, corolla profunde 5-loba subcampanulata lobis lineari-oblongis obtusis extus parce pilosis intus dense pubescentibus brunneis basi flavescentibus vel albidis, coronæ lobis quam columna staminum duplo longioribus erectis lineari-spathulatis minute hirtis apice conniventibus inferne dorso infra medium alato-carinatis et in dentem erectum productis, antheris apice barbatis, stylo apice depresso truncato quam antheræ multo breviore.

Habitat.—Natal: valleys of the Drakensberg, 6000—7000 feet, among grass, among and under boulders, January, *Evans*, 379.

Caules 1–2 ped. longi. *Foliorum petioli* 6 lin. longi, laminæ 10–16 lin. longæ, 8–16 lin. latæ. *Pedunculi* 9 lin.-2 poll. longi. *Pedicelli* 8–20 lin. longi. *Sepala* $1\frac{1}{2}$ lin. longa. *Corollæ tubus* 1 lin. longus, lobi $1\frac{3}{4}$–2 lin. longi, $\frac{1}{2}$ lin. lati. *Coronæ lobi* $1\frac{1}{4}$–$1\frac{1}{2}$ lin. longi, dente dorsali $\frac{1}{3}$ lin. longo. *Staminum columna* $\frac{3}{4}$ lin. longa.

244. **Anthocleista insignis,** *Galpin* [Loganiaceæ]; arbor erecta, glaberrima, 70-pedalis vel ultra; folia decussata, coriacea, convexa, supra nitida, subtus pallidiora, oblonga, obovata ,obtusa, basi anguste cuneata, magnitudine variabilissima in plantis juvenilibus maxima tanta quanta $4\frac{1}{2}$ ped. longa, 15 poll. lata, costa subtus multum prominente, venis penninerviis subtus leviter elevatis, petiolis brevibus vagina connexis, stipulis nullis; cymæ 30–80-floræ, quadrangulares, striatæ, florentes circa 13 poll. longæ, fructantes circa 20 poll. longæ, bracteis bracteolisque concavis obtusis sub-cartilagineis; sepala valde imbricata, oblongo-orbiculata, margine scariosa, subundulata; corolla flaviscente-albida, calyce quadruplo longior, tubo 14–$16\frac{1}{2}$ lin. longo supra ovarium leviter constricto, limbo $1\frac{1}{2}$–$1\frac{3}{4}$ poll. expanso, lobis 10–13 anguste oblongis acutuisculis autheris duplo longioribus reflexis; stigma exsertum, crassum, oblonga leviter 2 fidum; ovarium 2-loculare, basi spurie 4-loculare; bacca viridis, fusiformis, $1\frac{3}{4}$ poll. longa, 13 lin. crassa; semina reniformia, rugosa.

Habitat.—Swaziland: Horo Forest, alt. 1800 feet. October 1890. *W. Leyson*, herb. Galpin, 1358.

245. **Strychnos alnifolia,** *Baker* [Loganiaceæ]; erecta, fruticosa, ecirrhosa, foliis breviter petiolatis obovato-oblongis obtusis basi cuneatis modice firmis utrinque viridibus glabris supra basin triplinerviis, cymis copiosis compositis laxis axillaribus sessilibus, calycis tubo brevissimo lobis orbicularibus pubescentibus valde imbricatis, corollæ tubo brevi lobis oblongis tubo duplo longioribus, genitalibus potalis brevioribus.

Habitat.—Interior of Western Lagos, *Dr. Rowland.*

Folia 2–$2\frac{1}{2}$ poll. longa, 12–15 lin. lata. *Calyx* 1 lin. longus. *Corolla* 3 lin. longus. *Fructus* ignotus.

246. **Diascia cordata,** *N. E. Brown* [Scrophularineæ]; caule erecto superne laxe ramoso quadrangulari glabro, foliis petiolatis ovatis obtusis basi cordatis vel subcordatis marginibus serrato-dentatis dentibus parvis utrinque glabris viridibus, floribus in racemos laxos terminales 3–15-floris dispositis, racemis sparse glanduloso-pubescentibus, bracteis alternis sessilibus vel subsessilibus ovatis acutis dentatis glabris quam pedicelli 2–5-plo brevioribus, pedicellis fructiferis deflexis et apice incurvis, sepalis lanceolatis acutis 2 inferioribus paulo longioribus, corolla rosea minute glanduloso-ciliata explanata rotundata subbilabiata longe bicalcarata, labio superiore 4-lobo disco bifossulato lobis rotundatis 2 superioribus minoribus, labio inferiore late ovato obtusissimo, staminibus omnibus antheriferis filamentis brevibus parce glanduliferis, ovario glabro, stylo brevi, capsula ovoidea vel ellipsoidea, seminibus reticulato-rugosis.

Habitat.—Natal: Drakensberg, Tiger Cave Valley, 6000–7000 feet, January, *Evans*, 382; Polela 4000–5000 feet, April, *Wood*, 4582.

Caules 1–2 ped. alti. *Foliorum petioli* 1–3 lin. longi, laminæ 6–15 lin. longæ, 4–11 lin. latæ. *Racemi* 1½–9 poll. longi. *Bracteæ* 1½–4 lin. longæ, 1–2½ lin. latæ. *Pedicelli* 6–11 lin. longi. *Sepala* 1½–2 lin. longa, ½ lin. lata. *Corolla* 8 lin. diam. *Calcaria* 3 lin. longa. *Capsula* 2–2½ lin. longa, 1½ lin. crassa.

247. **Diascia purpurea,** *N. E. Brown* [Scrophularineæ]; caule erecto basi decumbente quadrangulari glanduloso-pubescente, foliis breviter petiolatis ovatis vel rotundato-ovatis obtusis basi sub-cuneatis vel subrotundatis leviter dentatis vel subintegris supra viridibus sparse glanduloso-pubescentibus vel inferioribus glabris subtus violaceo-purpureis nervis sparse glanduloso-pubescentibus, floribus in racemum compactum bracteatum terminalem dispositis, plus minusve glanduloso-pubescentibus, bracteis ovatis acutis inferioribus dentatis, pedicellis bracteis æquilongis vel longioribus, sepalis 3 superioribus elliptico lanceolatis subacutis basi contractis, 2 inferioribus majoribus elliptico-ovatis acutis, corolla inæqualiter bilabiata basi breviter saccato-tubulosa breviter bicalcarata, labio superiore maximo 4-lobo lobis rotundatis disco ad medium valde intruso vel carinato et prope apicem concavo, labio inferiore brevissimo latissime rotundato, filamentis 2 anticis anantheris erectis 2 posticis antheriferis reclinatis, ovario glabro, stylo incurvo.

Habitat.—Natal: Drakensberg, Tiger Cave Valley, among grass, scarce, January, *Evans*, 377.

Caules 6–12 poll. alti. *Folia* 9–16 lin. longa, 5–12 lin. lata. *Bracteæ* 3–4 lin. longæ, 2–2½ lin. latæ. *Pedicelli* 4-6 lin. longi. *Sepala* 2 lin. longa, ½–1 lin. lata. *Corollæ labium superius* 6 lin. longum, 5–6 lin. latum, labium inferius 1 lin. longum, 3 lin. latum. *Calcaria* 1½ lin. longa.

248. **Lyperia grandiflora,** *Galpin* [Scrophularineæ]; fruticulus erectus, undique viscoso-pubescens, post siccitationem scabro-pubescens, 2–4 ped. altus; rami adscendente, foliosi; folia subfasciculata, petiolata, variabilia, nunc lanceolata nunc oblonga vel ovata, acuta vel obtusa, serrata, basi cuneata, subtus prominenti-nervosa, 12–16 lin. longa, 3½–5½ lin. lata; racemi terminales, fructiferi 4–7 poll. longi, pedicellis fructiferis rigidis 5–8 lin. longis; calycis fructiferi segmenta latiuscule linearia, 3¾–4¾ lin. longa; corollæ tubus pubescens, 11–14 lin. longus, calyce quadruplo longior, limbus planus lobis latis truncatis integris vel subemarginatis,

4½–7 lin. longis, capsula anguste ovata, acuta, valvulis cuspidatis, calycem æquans.

Habitat.—Transvaal: abundant amongst scrub on the hillsides and in the valleys around Barberton, flowering throughout the year, but chiefly in June and July, alt. 2200–3500 feet, *Galpin*, 394; *MacOwan and Bolus Herb. Norm.* 1329, near Lydenberg, *Atherstone*; margin of woods on the Drakensberg, near Macamac Gold Fields, *McLea*, *Herb. Bolus*, 3024; without locality, *Mrs. Saunders*, 193, *Herb. Wood*, 3897.

249. **Vitex thyrsiflora**, *Baker* [Verbenaceæ]; arborea, ramulis glabris, foliis longe petiolatis 5–foliolatis submembranaceis facie viridibus glabris dorso pallide viridibus obscure pubescentibus, foliolis obovato-oblongis integris cuspidatis, cymis in paniculam amplam terminalem dispositis, bracteis linearibus parvis, pedicellis brevibus pubescentibus, calycis tubo campanulato dentibus deltoideis parvis, corollæ tubo calyce duplo longiore lobis oblongis parvis, staminibus lobis brevioribus.

Habitat.—Interior of Western Lagos, *Dr. Harrison* (collected in the year 1863), *Dr. Rowland.*

Foliola 6–8 poll. longa, medio 3–3½ poll. lata, petiolo terminali pollicari. *Calyx* 1¼–1½ lin. longus. *Corolla* 3 lin. longa.

250. **Acrocephalus lagoensis**, *Baker* [Labiatæ]; perennis, caulibus erectis pubescentibus, foliis sessilibus linearibus denticulatis utrinque pubescentibus, capitulis parvis globosis in paniculam amplam ramis corymbosis dispositis, bracteis primariis ovatis parvis pallidis pubescentibus, bracteis floralibus dense pilosis orbicularibus, calyce dense piloso, corollæ tubo cylindrico sursum dilatato, labiis parvis oblongis, staminibus limbo longioribus.

Habitat.—Interior of Western Lagos, *Dr. Rowland.*

Caulis sesquipedalis et ultra. *Folia* majora 2–3 poll. longa, medio 3–4 lin. lata. *Capitula* 4 lin. diam. *Corollæ* tubus 2 lin. longus.

251. **Eucomis humilis**, *Baker* [Liliaceæ]; foliis oblongis firmulis obtusis dorso purpureo maculatis, scapo brevissimo subcylindrico, racemo densissimo oblongo foliis reductis oblongis purpureo-marginatis coronato, pedicellis brevissimis, bracteis magnis lanceolatis, perianthio campanulato basi et ad marginem segmentarum purpureo, staminibus perianthio distincte brevioribus filamentis purpureis, stylo ovario æquilongo.

Habitat.—Natal: top of Tabamhlope Mountain, alt. 6000–7000 feet, *M. S. Evans*, 398!

Folia semipedalia, 2½–3 poll. lata. *Perianthium* 6 lin. longum.

252. **Kniphofia Evansii**, *Baker* [Liliaceæ]; radice apice fibrosa, foliis productis anguste linearibus erectis subcoriaceis paucinervatis marginibus incrassatis integris, scapo foliis paulo longiore, racemo denso oblongo, pedicellis brevibus inferioribus cernuis, bracteis ovatis scariosis albidis pedicellis æquilongis, floribus splendide rubris siccitate atropurpureis, perianthio cylindrico lobis brevissimis obtusis, genitalibus inclusis.

Habitat.—Natal: on the Drakensberg, alt. 6000–7000 feet, *M. S. Evans*, 353.

Folia sesquipedalia, 1 lin. lata. *Scapus* 1½–2 pedalis. *Racemus* 2–3 poll. longus. *Perianthium* 6 lin. longum.

Near *K. gracilis*, Harv., and *K. pauciflora*, Baker (Bot. Mag. t. 7269).

253. **Aloe concinna**, *Baker* [Liliaceæ]; breviter caulescens, foliis sublaxe dispositis lanceolatis recurvis utrinque viridibus copiose conspicue albo maculatis haud lineatis aculeis marginalibus magnis crebris deltoideis, scapo simplici foliis paulo longiore deorsum compresso, racemo subdenso, pedicellis brevibus ascendentibus apice articulatis, bracteis parvis lanceolatis, perianthio cylindrico tubo brevissimo lobis elongatis, staminibus inclusis, stylo demum exserto.

Habitat.—Zanzibar: *Sir John Kirk*. Received alive at Kew in 1884. It flowered for the first time April 1895.

Folia 3–4 poll. longa, 1 poll. lata. *Racemus* 2 poll. longus, pedicellis bracteisque 3 lin. longis. *Perianthium* pollicare.

254. **Aloe (Eualoe) minima**, *Baker* [Liliaceæ]; acaulis, foliis 10–12 suberectis rosulatis multifariis anguste linearibus basi valde dilatatis facie canaliculatis copiose albo-maculatis aculeis marginalibus crebris patulis albis lanceolatis, scapo simplici bracteis vacuis pluribus prædito, floribus dense racemosis, pedicellis ascendentibus, bracteis ovato-acuminatis magnis, perianthio cylindrico pallide rubello tubo brevissimo segmentis elongatis, genitalibus inclusis.

Habitat.—Natal: solitary amongst grass on the South Downs, *M. S. Evans*, 409.

Folia 5–8 poll. longa, supra basin 1½ lin. lata. *Scapus* 6–12 poll. longus. *Pedicelli* 3–6 lin. longi. *Perianthium* 4½ lin. longum.

255. **Ornithogalum (Caruelia) diphyllum**, *Baker* [Liliaceæ]; bulbo parvo globoso tunicis exterioribus membranaceis pallidis, foliis sæpissime binis linearibus glabris erectis, scapo foliis æquilongo, floribus sæpissime 2 erectis, pedicellis brevibus ascendentibus, bracteis lanceolatis, perianthio campanulato albo segmentis oblongis concoloribus imbricatis, staminibus perianthio duplo brevioribus filamentis linearibus conformibus, ovario globoso, stylo brevissimo.

Habitat.—Natal: summit of Tabamhlope Mountain, alt. 6000–7000 feet, *M. S. Evans*, 374.

Bulbus 3 lin. diam. *Folia* 1½–2 poll. longa, 1 lin. lata. *Perianthium* 3 lin. longum.

256. **Albuca (Falconera) humilis**, *Baker* [Liliaceæ]; bulbo ovoideo tunicis exterioribus membranaceis, foliis 3 anguste linearibus erectis glabris, scapo brevi, floribus 2–3 corymbosis pedicellis erecto-patentibus, bracteis parvis lanceolatis vel ovato-acuminatis, perianthio campanulato segmentis oblongis albis medio rubro-brunneis, staminibus omnibus antheriferis, stylo triquetro ovario æquilongo.

Habitat.—Natal: wet rocks at the top of Tabamhlope Mountain, alt. 6000–7000 feet, *M. S. Evans*, 361.

Bulbus 4–6 lin. diam. *Folia* 3–6 poll. longa, 4–6 poll. lata. *Perianthium* 6 lin. longum.

CCCCLXV.—SIAM BENZOIN.

Benzoin is also known in English commerce as Gum Benjamin. It is a gum-resin obtained by incision in the bark of trees in Sumatra and Siam. Benzoin is used as a stimulant and expectorant in chronic bronchitis. It is also one of the principal ingredients in Friar's Balsam, and is largely used for incense.

Sumatra benzoin is yielded by *Styrax Benzoin*, Dry., a well-known tree. Plants of this species are under cultivation at Kew, and many have lately been distributed to botanical establishments in the tropics of the New World. Of the tree yielding Siam benzoin we know very little. As long ago as 1865, Sir R. H. Schomburgk, when British Consul at Bangkok, was asked to investigate the subject, but although able to give, at second hand, a very interesting account of the mode of collecting the resin, he was unable to obtain botanical specimens of the tree yielding it. Of late years renewed efforts have been made to solve the problem.

Captain Hicks, of Bangkok, was successful in obtaining a few small plants of "gum benjamin from the Northern Laos States" in 1882. The survivors of these were presented to the Botanic Gardens at Singapore by Mr. Jamie. A fuller account of Captain Hicks' efforts is given by Mr. E. M. Holmes, F.L.S., in the *Pharmaceutical Journal*, XIV. [3], p. 355. The locality from which the plants were obtained was given as "Suang Rabang." This, we now know, is a misprint for Luang Prabang, a district in the extreme north-east of the Shan States of Siam, bordering on Tran Ninh, in the French territory of Anam. In the hope that the Siam benzoin tree might possibly extend to the Shan States of Burma, an application was addressed by Kew to the India Office in 1889, and as a result a careful inquiry was made by the Government of India in Tennaserim, Upper Burma, and the adjoining Shan States. In 1890 it was reported that "the efforts made to trace the existence of the plant in those localities have been unsuccessful."

Apparently, the first authentic information respecting the district in which the tree is to be found is contained in a recent Report by Mr. Beckett, forwarded to the Foreign Office by Mr. de Bunsen on the Trade of Siam for 1893 (Foreign Office, Annual Series, 1895, No. 1520). The following extract shows that Siam benzoin is obtained from an extremely circumscribed locality on the east bank of the River Mekong, in territory now occupied by the French. It is feared that the trade in this article will be ultimately diverted to Tonquin, which is nearer to the source of supply than Bangkok :—

" *Gum-benjamin.*—Of gum-benjamin, 319 piculs, or nearly 20 tons, figure in the export list, valued at 21,005 dollars, or 2713*l*. This valuable resin is also a product of the east bank of the Mekong, and is interesting as being confined to a narrow zone of forest-clad hill country to the east of Luang Prabang, lying between 19th and 21st degrees of north latitude and longitude east 102 to 105. Some three-fifths finds its way to Bangkok by way of Nan, and the remainder by way of Nongkhai and Korat. The French occupation of Luang Prabang does not seem as yet to have caused any perceptible effect on the Bangkok export of gum-benjamin beyond enhancing local prices, but with the completion of new roads, already initiated by the French with a view to speedier communication between Luang Prabang and Tonquin, Bangkok exporters, who are chiefly British, have well-founded fears lest the gum-benjamin trade be diverted entirely from Bangkok to Hanoi. The whole of the Bangkok export goes to the London market and thence to France and Belgium, to be manipulated into balsam. A small quantity is used locally for frankincense.

"Prices during 1893 were bad, first class gum-benjamin fetching 125 ticals per picul (or about 165*l*. per ton), and the second class, 45 ticals per picul (about 40*l*. per ton). The good quality known to buyers as 'bold blocky almondy' was scarce."

CCCCLXVI.—MISCELLANEOUS NOTES

MR. CHARLES HENRY HUMPHRIES, in the employ of the Royal Gardens, has been appointed by the Secretary of State for the Colonies Curator of the Botanic Station at Aburi, on the Gold Coast, in succession to the late Mr. William Crowther. Mr. Humphries entered the Royal Gardens in January 1892, having previously spent nearly nine years with Messrs. Kelway & Son, at Langport, Somerset. He had three years' experience in the tropical department at Kew, and attained to the rank of sub-foreman. He holds certificates for lectures in Elementary Physics and Chemistry, Organography and Systematic Botany, and Economic Botany.

MR. HUGH MCMILLAN, in the employ of the Royal Gardens, has been appointed by the Secretary of State for the Colonies, on the recomendation of Kew, Head Gardener of the Royal Botanic Gardens at Peradeniya, Ceylon. Mr. McMillan entered the Royal Gardens on the 21st August 1893. He had previously served at Cyfartha Castle and Cardiff Castle Gardens in South Wales. He has diligently attended the course of lectures at Kew, and holds certificates in five subjects, including British Botany.

MR. JOHN CHISNALL MOORE, in the employ of the Royal Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Curator of the Botanic Station at St. Lucia, in the Windward Islands, West Indies. Mr. Moore entered the Royal Gardens in December 1893. He was previously employed at Broadlands, Hants., the seat of the Right Honourable Evelyn Ashley. He holds certificates for attendance at lectures at Kew in Economic Botany, Organography, and Systematic Botany, and Geographical Botany.

Large Cacti.—The Royal Gardens are indebted to Professor James W. Toumey, of the University of Arizona, for a collection of large Cacti from that region. Amongst them are two specimens of *Cereus giganteus*, each 9 feet high and weighing 4 cwt. A still larger specimen of this may be seen in the Palm House, its height being 15 feet, and its weight about 9 cwt. This was purchased from a Californian nurseryman in 1890. It flowered in the year following, and a figure of it was published in the *Botanical Magazine*, t. 7222. Other large specimens among the recent arrivals are two of *Echinocactus Wislizeni*, each 6 feet high and weighing 4 cwt. Judging by the slow rate of growth of smaller examples of this species, which have been at Kew 10 years, these two large plants must be of very great age, probably hundreds of years. This species is remarkable for its bulky stems. The specimens are 2 feet in diameter, and armed with stout hooked spines, resembling strong jack hooks. There are also two large specimens of *Opuntia arborescens*, remarkable for its long spines, each enclosed in a loose pale yellow sheath; two equally large of *O. fulgida*, peculiar in the downward or "weeping" growth of its branches; two of *O. arbuscula* and three small plants of the new *Cereus Pringlei*, an ally of *C. giganteus*. These plants are at present grouped in the centre of the Succulent House (No. 5).

Botanical Magazine.—The plants figured in the May number are: *Kniphofia Northiæ*, *Vaccinium erythrocarpum*, *Argylia canescens*, *Veronica Hectori*, and *Cypripedium Charlesworthii*. With the exception of the *Veronica*, they were all drawn from plants that flowered at Kew. The *Kniphofia* was brought from Grahamstown, Cape Colony, to Kew in 1883 by Miss Marianne North, after whom it was named. With slight protection it bears our winters, and last year flowered freely in the open air at Kew in June. It is a vigorous caulescent species, resembling an *Aloe*, and there is a painting of it in the North Gallery, n. 367. *Vaccinium erythrocarpum* is a pretty North American hardy species, the berries being nearly black when ripe. *Argylia canescens* (Bignoniaceæ) is a member of an exclusively Andean genus. It has a thick caudex from which slender annual flowering stems are produced. The Kew plant was presented by T. King, Esq., of Garnett Hill, Glasgow. *Veronica Hectori* is a New Zealand species of the group, having small closely imbricated leaves like a cypress. It was drawn from a specimen communicated by Dr. Balfour, Regius Keeper of the Edinburgh Botanic Garden. The plant of *Cypripedium Charlesworthii* figured was purchased at an auction sale. It is an ornamental species inhabiting the Shan Hills, Upper Burma—not the province of Aracan, Bengal, as stated in the Magazine.

All the plants figured in the June number were drawn from specimens cultivated at Kew. *Crinum Schimperi* is a handsome Abyssinian species, received at Kew both from the Berlin Botanic Garden and Mr. Max Leichtlin of Baden-Baden. *Trichocladus grandiflorus* belongs to an exclusively South African genus of the Hamamelideæ. It was raised from seeds communicated in 1890 by Mr. E. E. Galpin of Queenstown, Cape Colony, and flowered in the Temperate House for the first time in 1894. *Ribes bracteosum* is a striking species discovered by David Douglas in 1826, at the mouth of the Columbia River in Oregon. The history of its introduction to Kew is unknown, and it does not appear to be in cultivation elsewhere in this country. *Peraphyllum ramosissimum*, from the same region as the last, has been in cultivation at Kew for upwards of 20 years, but was never known to flower till 1894; a season to be remembered for the many plants that produced flowers the first time here, in consequence of the unusual amount of sunshine during the previous summer and autumn. It is a member of the Pomaceæ, and closely allied to *Amelanchier*. The last is *Rosa Luciæ*, a pretty white-flowered prostrate species, native of Japan, which was presented to Kew by Professor Sargent, Director of the Harvard Arboretum, Boston, U.S.A., under the name of *R. wichuriana*.

Donation of Books.—The Misses Case of Heath Brow Cottage, Hampstead, have presented 16 volumes of botanical books to Kew, chiefly relating to British plants, and consisting mainly of different editions of works by authors already represented in the library. Among them Bingley, J. Donn, Knapp, Lees, and Withering.

Kniphof's Botanica in Originali, seu Herbarium Vivum, 1758–1764.—The name Kniphof, as commemorated in the genus *Kniphofia*, is not unfamiliar, but comparatively few persons will know anything of the history of the man who was the author of the work of which the above is the abbreviated title. An uncut copy of this rare and curious botanical book has lately been added to the Kew library. It is interesting historically, both on account of its being a record of plants cultivated at that date in Germany, and chiefly, in all probability, at Erfurt, as it was there the author resided, and also on account of its being one of the earliest, if not actually the first, work of considerable extent, in which the process of nature-printing was employed to illustrate plants. It would appear that D. Brükmann, a contemporary of Kniphof, was really the inventor, if it may be so termed, of this method of representing plants, as there is a published letter by him on the subject addressed to Kniphof, dated 1733; but this is not in the Kew library. The title is: *Sendschreiben an* J. H. Kniphof, *die Art die Kräuter nach dem Leben abzudrucken und also compendiöse Herbaria picta zu machen, vorstellend.* The full title of the work in question is: Botanica in Originali seu Herbarium Vivum in quo Plantarum tam Indigenarum quam Exoticarum peculiari quadam operosaque enchiresi atramento impressorio obductarum Nominibusque suis ad Methodum Illustrium nostri aevi Botanicorum Linnaei et Ludwigii Insignitarum elegantissima ectypa exhibentur. Opera et Studio Joannis Godofredi Trampe.

There are two foolscap folio volumes containing 1202 figures, one on each leaf, besides a number introduced on the title pages of the 12 parts in which it was issued, for the purposes of embellishment, making a total of 1250 species represented. Figure 515 is missing. The Kew copy is probably unique in being coloured, the colouring being most likely the work of a private person, for there is no mention of coloured copies by any of the bibliographers. The colouring is generally well and effectively done, though in some instances it is to some extent neutralised by the too intense blackness of the print. This copy first belonged to J. G. Menn, M.D., Professor Publicus Primarius at Cologne, who seems to have acquired it in 1764, the date of the publication of the last part. Subsequently it must have passed into English hands, as some person has written, in a very neat hand, the English names of many of the plants.

The arrangement is alphabetical, with the Linnean names of the first edition of the *Species Plantarum*, and references to the pages of that work, as well as the *Systema*, and Ludwig's *Definitiones Generum Plantarum*. The "specific phrases" of the *Species Plantarum* are also reproduced.

Indian Plants.—The Rev. R. Huter, of Sterzing, Austrian Tyrol, has presented a collection of dried plants, made by Hieronymus Rastler, a missionary, near Bethia, North Behar, and on the Nepal frontier. It consists of about 450 species, including a few new ones.

Natal Plants.—Mr. J. Medley Wood, A.L.S., Curator of the Natal Botanic Garden, has presented a further small parcel of dried plants of great interest.

Plants of the Milanji Hills.—Mr. H. H. Johnston, C.B., Commissioner and Consul-General in British Central Africa, has transmitted a small collection of dried plants, made by Mr. J. McClounie, together with a few seeds. Most of the plants are the same as those collected by Mr. Whyte, and published in the *Transactions of the Linnean Society* (Botany, 2nd series, vol. iv., pt. 1, pp. 1–68, tt. 1–10), but they include a number of which Kew did not previously possess any Herbarium specimens, notably the cypress, *Widdringtonia Whytei.* There are also three or four apparently undescribed species, of which the material in some instances is insufficient for description.

Flora of British Somali-land.—Miss Edith Cole and Mrs. Lort Phillips and party made a journey in this country last winter and early spring, and collected and dried about 300 species of flowering plants and a few ferns, which they have generously presented to Kew. The country traversed was from Berbera to the Golis range of hills, which rise to a height of 5000 feet. In view of the comparatively recent partial botanical investigation of the island of Socotra, and Mr. Bent's collections from Southern Arabia, together with the fact that little is known of the flora of Somali-land, some highly interesting results are expected from the working-out of these ladies' collections. The Acanthaceæ, especially, are very strongly represented; there is a new fern; and the three orchids include an apparently new species of *Epipactis*, a genus not previously known to inhabit tropical Africa, though we believe Mr. Scott Elliot also collected a species in the Ruwenzori mountains. Miss Cole also collected and presented to Kew plants of a species of *Eulophia*, a *Dracæna*, various bulbs, and 20 packets of seeds.

Anthocleista insignis.—Mr. E. E. Galpin, of Queenstown, South Africa, whose description of this tree is given at p. 150, sends the following note respecting it:—

This handsome tree is abundant in the Horo forest and yields a very useful timber. The wood is white, soft, easily worked, and, I believe, hardens with age. Being very even grained it is not liable to split, and was used for making the bodies of the ore trucks required for the Horo mine, for which purpose it proved itself to be admirably adapted. The young trees shoot up to a height of 30 feet or more without a branch, and, bearing at their summit a cluster of magnificent leaves which are considerably larger than those borne by the mature trees, and give the tree a somewhat palm-like appearance. Not having an opportunity of visiting the locality during the flowering season, I am indebted to Mr. William Leyson, the courteous manager of the Horo Concession, for a fine series of flowering and fruiting specimens, which were only to be got at by felling the trees bearing them. [A plant is growing at Kew].

Dried Plants from South Arabia.—Mr. J. Theodore Bent has returned from a second journey in Arabia Felix, bringing with him a collection of dried plants, made by himself, and generously presented to

Kew. The parts visited by Mr. Bent on this occasion were the neighbourhood of Muscat, and the hilly region near Merbat, a little westward of the Kuriyan-Muriyan Islands. Almost all of the plants, about 250 in number, were collected at the latter place, in the Dhofar mountains, which rise to a height of about 3000 feet. Mr. Bent avoided collecting plants he recognised as having been collected by Mr. Lunt, who accompanied him on his visit to the Hadramaut country, which was a pity, because many of them are very rare, or at least only represented in herbaria by Lunt's specimens. He also eschewed the common coast plants and weeds of cultivation, which was more to the purpose. This collection is not so rich in novelties as the previous one, containing no new generic type, though nearly a score of the species appear to be undescribed. It manifestly illustrates the westward extensions of types common to Baluchistan and Sind. A very distinct wild cotton, *Gossypium Stocksii*, is a noteworthy example. It had previously only been found in Sind, and some authorities have regarded it as one of the wild progenitors of cultivated cotton. Merbat is near the centre of the Arabian Frankincense country, and Mr. Bent obtained good specimens of the true plant, *Boswellia Carteri*, Birdw., as well as one of the Myrrhs, *Balsamodendron Opobalsamum*. Mr. Bent has exhibited a selection of his plants both at the Royal Geographical Society and Royal Society.

The Flora of the Solomon Islands.—Since the preceding paper (p. 132) on Mr. Comins's plants was put into type, Kew has received, through Rear-Admiral Wharton, C.B., Hydrographer to the Admiralty, another small collection of dried plants and a box of orchids from this interesting group of islands, made by the officers of H.M.S. "Penguin," Commander A. F. Balfour. There are several probably undescribed plants, including two species of *Begonia*, a very handsome *Eugenia*, a *Myristica*, some Scitamineæ, and orchids. The curious *Lepinia taitensis* was found in the island of New Georgia, where indeed most of the plants appear to have been collected; and the seeds appear to be good. There are also good seeds of *Cominsia Guppyi*, Hemsl., a singular member of the Scitamineæ figured in the *Annals of Botany*, v. t. 27. But the most important part of the collection consists of leaves, female inflorescence, and seeds of the *Sararanga sinuosa*, Hemsl., (Pandanaceæ) described and figured from very imperfect materials in the *Journal of the Linnean Society*, xxx., p. 216. t. 11. There are also photographs showing the habit of the tree, and Lieutenants B. T. Somerville and S. C. Weigall communicated the following description and particulars of this very distinct screw-pine.

"In New Georgia, Solomon Islands, it was found growing exclusively at the estuaries of rivers, never in very large quantities, and generally in clumps of three or four. The natives say that it does not grow on the hill tops, but only in such positions as we found it, close to the water; and that it is not very common anywhere. Their name for it on the Northern coast is '*Ndalú*,' while at Rubiana, on the Southern side of New Georgia, it is called '*Pate*.'

It is said by the natives of Savo Island to exist there also.

"The average height of a full grown tree is 60 feet, including the branches, which radiate out from the stem at the top of the trunk only, to a length of about 10 feet.

"One specimen, growing on a small point of river boulders and sand, affording but poor nourishment and root-hold, had the lower part of the trunk to a height of 6 feet from the ground, enclosed in a thick covering of small tendril-like roots, closely adhering together, and tightly packed in to the tree, following its contour, giving the appearance of a sudden thickening of the bark. A specimen is enclosed of these rootlets. There were no aerial roots in any instance. The tree is in flower between October and January; though these months probably do not represent the limits between which this occurs.

"The flower head grows in the centre of the leaf-branches, which themselves occur at the end of the large branches radiating from the head of the trunk. It consists of a tough main stem, strongly bent at the foot, so as to cause the flower head to hang downwards, from which spring 30 flower-branchlets diminishing in size to the point, which forms a branch itself. They grow two in opposition, followed by two more in opposition, but placed on the opposite diameter of the main stem.

"The lowest, largest flower-branchlet had 16 minor branches springing from it, growing irregularly both in distance and position, and bearing 162 blossoms.

"When first cut down the blossoms had a faint fetid odour like that of a harvest-bug, which, however, soon passed off.

"The following measurements of the flower-head were made:—

Extreme length from base of stem to tip { 45 inches / 60 ,, } Two specimens.

Girth of stem at lowest flower branch -	4½ inches
Distance between two flower branchlets -	3½ ,,
Length of first flower branchlet - -	11 ,,
Length of last flower branchlet - - -	4¾ ,,
Length of head branchlet - - -	7¼ ,,

"The distinguishing feature of the leaves of this species is that there are no spines or thorns on the edges, or mid-ribs for the greater part of their length. The species already described from Fauro Island, by Surgeon Guppy, appears to have had only a few at the very point. In the New Georgian variety, as will be seen, there are spines for a short distance from the base of the leaf upward, and from the point of the leaf downward, continuing farther still down the mid-rib.

"The leaves grow in clumps at the end of the boughs, their bases following one another in the form of a screw-thread. There were 29 leaves in one average-sized bunch that was counted.

"The following averages were made from the measurements of three fully matured leaves:—

	Ft.	in.
Whole length of leaf about - - - -	7	10
Distance from base, bearing spines on the edges -	2	0
Intermediate space, clear of spines - - -	5	0
Distance from point bearing spines on the edges -	0	10½
,, ,, ,, mid-rib -	2	8

The point of the leaf is shaped like a bayonet, and is usually brown, except in the younger leaves."

(Signed) Boyle T. Somerville, Lieut. R.N.
S. Weigall, Lieut. R.N.

The foregoing particulars are valuable, and, together with the specimens will permit of a more complete description of the plant than has hitherto been published. Unfortunately, the male inflorescence and flowers are still unknown. There is no doubt, however, in spite of little discrepancies in the descriptions, and the fact that Mr. Guppy met with the tree only at the summit of Fauro Island (at an elevation of 1600 to 1900 feet), that one and the same species inhabits the two very different situations indicated. On consulting Guppy's work (*The Solomon Islands*, p. 288) in relation to this question, it was found that he mentions a species of *Begonia* being common on the slopes of the hills of Fauro Island, though there was no specimen in the collection he presented to Kew.

The box of orchids mentioned above was a disappointment, most of the plants being dead, owing to excessive dryness. A *Dendrobium*, *Cœlogyne*, and *Grammatophyllum* may be saved.

Date Cultivation in South Australia.—On the motion of the Hon. R. A. Tarlton, a report was presented to the Legislative Council of South Australia recommending the cultivation of the Date Palm in the Far North districts in 1884. Since that time the Woods and Forests Department has given special attention to the subject. The principal operations were carried on near Hergott Springs. In June 1891, there were 13 plants four years old, 285 one year old, and 53 just planted out. All had been raised from seed. The largest plants were from 3 feet to 4 feet high. Suckers were subsequently obtained from Kurrachee through the agency of Afghans bringing camels to the Colony. In the *Report* of the Woods and Forests Department for 1892–93 it is stated: "The results attending the cultivation of the date palm at Hergott Springs have been very gratifying . . . . The 13 older seedling palms are now 6 feet to 10 feet high, and the younger ones are growing at an equally vigorous rate. The most encouraging feature is the successful ripening of a good-sized bunch of dates of very fair quality on a palm planted barely six years ago." A male palm flowered in August and a female palm in September following. The latter was artificially fertilized, and in 158 days' time the ripe fruit was gathered. "It was not expected that this fruit would be of superior quality, seeing that it was produced by a seedling palm from seed of unknown kind. . . . The dates were, however, pronounced to be of fair marketable quality, and their perfect maturity affords definite proof of the possibilities open to date culture in the South Australian interior." In the *Report* for 1893–94, just to hand, further particulars are given: "The older palms are from 6 feet to 11 feet in height . . . nine of them have flowered; of these, six were male and three female palms." The bunches produced weighed respectively 2¼ lbs. and 7¾ lbs. "It is interesting to note that one of these bunches was fertilized by pollen from a freshly cut male spadix, and the other by pollen from a male spadix which had been kept for six weeks in a box. In each instance the operation was most successful, hardly a date failing to mature." Suckers of the celebrated "Deglet Nour" date palms from Algeria, 50 in number, have this year been received at Adelaide. They were obtained through the courtesy of the French Governor-General from proprietors at Biskra, whose plantations are renowned for the superior quality of the fruit. The suckers were carefully tended at the experimental garden at Hamma, and shipped by way of Marseilles. They arrived in South Australia in excellent condition. A similar consignment was received at Sydney for the Government of New South Wales. In Queensland efforts are also being made to establish date cultivation. The late Dr. Bancroft exhibited samples of dates grown in Queensland at a meeting of the Acclimatisation Society in May 1893.

Orthezia insignis.—The *Tropical Agriculturist* for January 1895 contains a paper by Mr. E. E. Green, of Ceylon, on "an important Insect Enemy." From this article the following extracts are taken :—

"In Dr. Trimen's Annual Report on the Botanical Gardens for 1893, mention was made of the occurrence in the Peradeniya Gardens of a serious insect-pest which was most destructive to the ornamental shrubs there. As this pest has been increasing very rapidly and has already spread beyond the limits of the Gardens, it is important that general attention should be drawn to it.

"Within the Peradeniya Gardens efforts are being made to keep it in check, but it has appeared on Lantana in the neighbourhood, and there is no knowing where it will stop. It has, fortunately, as yet shown no taste for either of our two most important products, tea and cacao. Coffee, however, does not share this immunity, for trees of Liberian coffee have been observed to be infested with the insect, and we have no reason to suppose that the Arabian species will be less liable to attack.

"Dr. Trimen is of opinion that this is mainly a garden pest, and does not expect that it will spread to estates. It is to be hoped that this prediction will prove correct, but it would be unwise to ignore the fact that, if unchecked, the pest might spread enormously and might possibly develop a taste for other plants, as was the case with the 'Fluted Scale' (*Icerya Purchasi*), which, at first practically confined to acacia and orange trees, finally became almost omnivorous" (p. 437).

* * * *

"The insect is known to entomologists by the name of *Orthezia insignis*, Douglas, being first described by Mr. J. W. Douglas from specimens found in Kew Gardens, where it is now said to be doing an enormous amount of damage in the plant houses. It has more recently been figured and described by Mr. Buckton under the name of *Orthezia nacrea* (*Indian Museum Notes*, Vol. III., No. 3, p. 103). The specimens submitted to Mr. Buckton were unfortunately damaged in transit; his figures are consequently not very satisfactory. Comparison with specimens from Kew proves the two insects to be specifically identical.

"Originating as it does in the Peradeniya Botanical Gardens, there is little doubt but that we owe the introduction of this pest to plants received from Kew. Its native country has not been determined" (p. 437).

Mr. Green's statement as to "the enormous amount of damage in the plant-houses" caused by the insect is very much exaggerated, and I am unable to ascertain the authority on which it is made. Mr. Buckton, in *Indian Museum Notes* (l.c. p. 104) says :—"The Kew insect appears to be spreading over the hot-houses of England, and seems to be very difficult to annihilate. It does as much mischief as the more common 'mealy bug.'"

Orthezia insignis was first described in the Entomologist's Monthly Magazine for January 1888. Mr. Douglas says:—"In August Mr. Edward T. Browne, Uxbridge Lodge, Shepherd's Bush, sent me several examples of this species, which he had obtained in the Royal Gardens at Kew, requesting that I would describe it if new, and he added the following particulars:—'First found on *Strobilanthes*, a Chinese plant, which has been in the Economic House three years; it may now be seen in the adjoining house on other foreign plants.'"

The Assistant Curator has furnished the following report on the subject:—

"The Chinese *Strobilanthes* referred to is *S. flaccidifolius*, Nees (*Bot. Mag.* t. 6917), which was received from Hong Kong in May 1886. This plant is not much affected by the *Orthezia*, whereas *S. gossypinus* and *S. cuspidatus*, two Indian species introduced by means of seeds received from Ootacamund in 1887, have been much subject to it, as also are other species of *Strobilanthes* from India and Ceylon. The only other plants upon which the *Orthezia* appears to thrive are *Manettia bicolor* and *Streptocarpus*. No appreciable harm is done to the plants by the *Orthezia*, even when they are badly infested. It is the least harmful of all the insects parasitical on plants at Kew. It has been noticed in the tropical houses for about ten years, but we cannot trace its source."

In *Timehri* (vol. iii. new ser., 1889, p. 308) Mr. S. J. McIntire figures the *Orthezia* with the remark:—"Noticed as a stranger among the plant vermin of Kew Gardens, into which place, we now know, it must have been introduced upon some plant from British Guiana."

In *Timehri* (vol. iv., 1890, p. 304) Mr. R. Ward gives the following account of the habits of the *Orthezia*:—"This pest affects many plants, especially those that are herbaceous or soft in texture. . . Although common, it is not nearly so destructive or troublesome as many of its allies. In the young state it is very abundant; after it becomes fully developed it is more easily preyed upon by its natural enemies, which play an important part in limiting its ravages. In this respect no insects are more assiduous than the grubs of the different species of *Coccinella*, *Syrphas*, the various *Hemerobidæ*, of which the different species of *Chrysopha* act a chief part."

Mr. Ward was appointed to the Botanic Gardens in Demerara from Kew in 1886. He does not say if his observations were made on the insect in Demerara. It may, however, be presumed that they were, and that he had known the *Orthezia* for some time.

As far as Kew is concerned, the *Orthezia* is rather a scientific curiosity than a troublesome pest.

The dispersion of plant diseases through the interchange of plants is undoubtedly a peril requiring careful precautions. The *Phylloxera* was introduced from England into Switzerland. The Coffee-leaf disease (*Hemileia*) has been conveyed from Ceylon on the one hand to Fiji (with tea seeds), where it practically extinguished the promising coffee industry, and to German East Africa on the other. It has always been a matter of the deepest anxiety lest by any accident it should be introduced through Kew to the New World, where it does not at present exist. It has been no less a matter of anxiety lest the Coffee-leaf miner should be introduced into the Old World. Kew extends, undoubtedly, an involuntary hospitality to many strange guests, which come unbidden, no one knows whence. The remarkable land Planarian, described by the late Professor Moseley as *Bipalium Kewense*, which is generally to be found in the houses, is a case in point.

It is undoubtedly possible that the *Orthezia* may have reached Ceylon by way of Kew. It is not, however, very probable, and the reverse may just as well have been the case. It exists in the public exhibitions, however, from which plants are not drawn for exportation. The plants in the propagating houses from which distribution is made are kept scrupulously clean, and every precaution is taken to send them out free from taint of any sort or kind.

Niger Coast Protectorate.—In a Report on the Administration of the Niger Coast Protectorate, presented to the Foreign Office, for the years 1891–94, pp. 5 and 6, Sir Claude MacDonald, K.C.M.G., gives the following interesting account of the efforts made to establish a Botanic Station and develop the resources of the extensive territory under his charge:—

"It will be seen on perusing my brief remarks on the subject of the trade of the district, that the principal, and, by comparison, the only article of export is derived from the fruit of the palm tree *Elæis guineensis.* I have frequently pointed this out to the native trader, and have endeavoured to rouse him to the fact that his country produces other articles which, from a commercial point of view, are more valuable even than palm oil. The native trader is, however, difficult to move and very conservative. What was good enough for his father is good enough for him. There are, however, some notable exceptions to this rule, and one or two of the native chiefs are waking up to the advantages of trading in articles other than palm oil. To the end that every encouragement may be given to the cultivation and collection of various natural products, a botanic station has been started at Old Calabar. I enclose a Report by Mr. Horace Billington, Curator of the Station, showing what work has been done on the station, as also a report by him on the botany of the country lying to the eastward of the Old Calabar River, and a similar report of the banks of the Cross River. By my instructions, Mr. Billington has drawn up a very useful little pamphlet, which has been translated into Efik, the native language of Old Calabar, and distributed gratis to the chiefs in this river, and to some in the others, giving useful rules and hints respecting the growing of coffee and cacao. To further encourage this industry, free gifts of young coffee plants are made to chiefs who will clear the ground for their reception, and as the plant does not bear until its fourth year, a small grant is made yearly for each plant alive and healthy at the end of the third year. When the plant begins to bear the grant ceases, and the plant then becomes the property of the planter, and begins to pay for itself. The export of coffee from the Protectorate was in the first year of the new Administration 2798 lbs.; in the second year 28,099 lbs. The export of cacao in the first year was 21,760 lbs.; and in the second year 51,299 lbs. When, therefore, the natives begin to learn the lessons taught by the botanic garden, I anticipate a large increase in the export of this as well as other and new products. It will be seen in the Curator's Report that the garden has been visited by several native chiefs, who have shown an intelligent interest in the same. Mr. Billington is a most enthusiastic and painstaking official."

Cultural Industries at the Gold Coast.—The following extract is taken from the Report on the Gold Coast for the year 1893, lately published by the Colonial Office. [Annual Series, 1895, No. 136] :—

"The only important advance which has been made in the cultivation of plants of economic value has been with respect to coffee. Several additional coffee plantations of small size have been started by the natives in the country of Akwapim, and the larger plantations in the neighbourhood of Cape Coast, more especially that owned by the Glasgow firm of Messrs. Miller Brothers and Company, are beginning to produce the coffee berry in paying quantities. It will be seen on referring to the table of exports, that the export of coffee has increased from 12,899 lbs. in 1892 to 21,437 lbs. in 1893.

"It is satisfactory to note that the export of kola-nuts has increased, the value in 1892 being 1328*l.* 7*s.* 3*d.*, whereas it was 25,716*l.* 5*s.* 7*d.* in 1893. I stated in my report for 1892 that more would be heard of kola-nuts as an article of export, and there is every reason to suppose that attention is now being given to this valuable commercial product, which is to be found in large quantities in the hinterland of the Gold Coast.

"The trade in rubber was very good, as the following comparison with the trade in 1892 shows :—

———	Weight.	Value.		
	lbs.	£	*s.*	*d.*
1892 - - - - -	2,663,020	166,659	16	8
1893 - - - - -	3,395,990	218,162	8	3

"A good deal of general work has been done in the Government botanical station during the year and considerable attention has been paid to the plantations of coffee and cacao, in the cultivation of both of which, but more especially the former, the natives appear to have become interested. Along the road leading from the botanical station through the country of Akwapim to the interior are large numbers of small clearings in which coffee plants, chiefly obtained by purchase from the botanical station, are to be seen in a most flourishing condition. The Liberian coffee plant appears to thrive best, but there are large quantities also of the Arabian coffee plant, the berry of which, however, is small and apparently deteriorated. It will probably be necessary for the Government at no distant date, if the coffee industry is to be fostered into a trade, to instruct these native cultivators in the proper way of preparing the berry for export. At present the most primitive method is employed. The berries are scraped by hand with a round stone worked in the hollow of a larger stone, and after this process they are washed and dried in the sun. It is obvious that a large crop could not be so dealt with, and that the employment of machinery in the near future is imperative. The initiative will have to be taken by the Government, because of the general ignorance on the part of the natives of all machinery, even of the simplest character, and because no single native cultivator possesses sufficient capital, enterprise, or experience to take the matter in hand. In February, many parts of the Colony were visited by large swarms of locusts. At Accra they took about three hours in passing over the town, and at the botanical station some damage was done by them to the plantains."

Industries in Florida.—In the *Kew Bulletin*, 1895, pp. 125, 126, a note was given respecting the serious effects on the orange groves of Florida of the extremely cold weather experienced there on the 28th December 1894 and the 7th February 1895. The extent and value of the tropical and sub-tropical cultivation in Florida, including that of orange growing, were very considerable. The following tables are taken from a Foreign Office Report (Annual Series, 1895, No. 1542) on the Agriculture of the Southern States by Mr. Consul C. L. St. John:—

TABLE 1.

RETURN of Vegetables and Garden Products of Florida (Products of 45 Counties) for the Year 1891.

Articles.	Acres.	Quantity.	Classifier.	Value.
				Dollars.
Egg plant - -	101	5,168	Barrels -	15,983
Squashes - - -	219	13,270	„ -	20,533
Cabbages - -	2,582	219,388	„ -	210,320
Beans - - -	977	80,616	Crates -	112,823
Cucumbers - -	798	56,339	„ -	63,739
English peas - -	123	5,576	„ -	6,950
Beets - - -	114	10,865	„ -	8,533
Water melons - -	2,897	1,895	Car loads -	136,569
Tomatoes - -	4,098	421,746	Boxes -	325,226
Irish potatoes - -	710	45,020	Bushels -	62,149

TABLE 2.

RETURN of the Fruit Crop of Florida for the Year 1891.

Articles.	Bearing Trees.	Quantity.	Classifier.	Value.
				Dollars.
Oranges - - -	2,422,489	3,585,564	Boxes -	3,838,517
Lemons - - -	32,431	31,586	„ -	50,348
Limes - - -	16,694	9,375	„ -	5,536
Peaches - - -	226,739	74,725	Bushels -	83,465
Figs - - -	—	8,714	„ -	4,146
Plums - - -	—	5,817	„ -	8,948
Avocado pears - -	—	542	Barrels -	1,605
Sugar apples - -	4.555	2,783	„ -	7,824
Pears - - -	199,176	25,366	„ -	58,254
Grape fruit - -	12,123	8,744	„ -	18,627
Bananas - - -	—	50,822	Bunches -	22,189
Strawberries - -	—	1,054,717	Quarts -	163,212
Pineapples - -	—	8,240,180	Apples -	612,780
Cocoanuts - - -	55,468	41,910	Nuts -	1,702

The Consul adds:—"In giving the foregoing tables showing the various products of the State of Florida it will be understood that I have very much in view that this information will be of value to our people in the British possessions where the climates are like the climate of Florida. It will be seen by the tables how many things are grown in Florida that really can be grown in our tropical and semi-tropical places. In fact, many of the products referred to are now cultivated in the British West India Islands, but not by any means to such extent and on such business principles as carried out in Florida, and which mode of cultivation can alone lead to such money results as are obtained in Florida in such agricultural pursuits."

In a further Foreign Office Report (Annual Series, 1895, No. 1551) the following further particulars are given respecting the disaster that has overtaken the orange industry in Florida:—

"On December 28, 1894, the outlook in Florida was very bright. The orange groves had fruited more generously than usual. Already the growers had marketed about 3,000,000 boxes of oranges at remunerative prices. There were still on the trees 2,500,000 boxes of oranges. But when the morning of December 29 dawned all this had been swept away; for the mercury had fallen to freezing point, and the oranges were found frozen hard. In a few hours fruit worth several millions of dollars had been turned to ice.

"Developments during January, however, seem to confirm the assertion of orange-growers that the December frost had not materially injured the old trees. The weather that followed the Christmas blizzard was exceptionally favourable, and soon it was reported that trees were shedding the leaves that had been blighted, and were putting forth new growth.

"On February 7 everything seemed to point to a good crop; but this cheerful prospect was destined to be succeeded by a condition of hopeless despair, for the mercury, as was mentioned elsewhere in this report, fell to 20 degrees below freezing point. The opinion prevailing is that the last frost was fatal to the trees, and that it will be years before they can recover. No full crop can be expected before 1897. Many of the trees have been split to the ground. Several weeks have elapsed since the cold wave—weeks of the most favourable weather—and no signs of life have been shown by the great majority of the groves. To judge by their appearance, the trees are only fit for firewood."

Persian Zalil.—In the *Kew Bulletin*, 1889, p. 111, a description was given, with a plate from the *Botanical Magazine*, t. 7049, of the Persian dye-plant Zalil. The plant was first described in the *Transactions of the Linnean Society*, sec. 2, vol. iii., p. 30, in the report on the Botany of the Afghan Delimitation Commission from the collections made by Brigade-Surgeon Aitchinson, C.I.E., F.R.S. It is a plant of considerable economic value. The flowers are collected largely for exportation for dyeing silk. The following note on Zalil is taken from the *Journal of the Society of Chemical Industry*, vol. xiv., 31st May 1895, where it appears as a contribution from the Clothworker's Research Laboratory in the Dyeing Department of the Yorkshire College, Leeds, by Professors J. J. Hummel and A. G. Perkin:—

Delphinium Zalil.—This is a perennial herbaceous plant belonging to the *Ranunculaceæ*, which bears a spike of yellow flowers 2 feet in height. It is abundant in certain parts of Afghanistan, *e.g.*, on the downs of the Badghis, and in the vicinity of Gulran, and in Khorasan.

The dyestuff, known as *Asbarg*, consists of the dried flowers and flowering stems, which are largely exported from Kabul and Khorasan, *viâ* the Punjab, into all parts of India. It is used in the native calico printing, but chiefly in silk-dyeing, along with *Datisca cannabina* roots, and with alum mordant, for the production of a bright sulphur-yellow colour known as *gaudhaki*. Its price is 27½ rupees per cwt.

The chemistry of this dyestuff has still to be studied, and this we hope to do as soon as further supplies, already asked for, come to hand.

The dyeing properties of *Delphinium*, both on wool and cotton, are very similar indeed to those of *Sophora*, from which it differs only by having less dyeing power. Compared with the ordinary dyewood it is, therefore, most similar to quercitron bark, and compared with this dyestuff on wool with tin mordant, it appears that 1·75 grms. quercitron bark are equal in dyeing power to 5 grms. delphinium, but the latter gives a much purer yellow, *i.e.*, less orange. It would, therefore seem to have about half the colouring power of Sophora-buds.

Although quite a good dyestuff for native use, the comparatively low colouring power of *Delphinium Zalil* flowers will prevent it from finding any employment in Europe.

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

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CCCCLXVII.—VANILLAS OF COMMERCE.

An article on the cultivation and curing of Vanilla appeared, with a plate, in the *Kew Bulletin*, 1888, pp. 76–80. Other articles have appeared in the *Bulletin* in 1892, p. 212; 1893, p. 327, and 1894, pp. 206-208. The following historical and descriptive account of the species yielding aromatic fruits, more or less used in commerce, has been prepared by Mr. R. A. Rolfe, A.L.S., Assistant in the Kew Herbarium.

The principal species is *Vanilla planifolia*, Andr., a native of South-eastern Mexico, now widely cultivated in many tropical countries. *V. Pompona*, Schiede, yields the Vanilloes of Guadeloupe, while the allied *V. Gardneri*, Rolfe, is said to yield Brazilian or Bahia Vanilla. Both *V. appendiculata*, Rolfe, and *V. odorata*, Presl., produce aromatic fruits, but there is no evidence that either is cultivated at the present day for economic purposes. *V. phæantha* is under cultivation at Jamaica and Trinidad as a vanilla plant. The fruit has, however, very little perfume.

Mr. Rolfe has monographed the known species of the genus, 50 in number, and the result will be communicated to the Linnean Society. The descriptions of the species either known or likely to be of economic value have been extracted for the present paper. They bear the numbers attached to them in Mr. Rolfe's systematic enumeration :—

From historical accounts we learn that vanilla was used by the Aztecs of Mexico as an ingredient in the manufacture of chocolate prior to the discovery of America by the Spaniards, who adopted its use, and Morren states that it was brought to Europe as a perfume about the year 1510 at the same time as indigo, cochineal, and cacao, and ten years before the arrival of tobacco.

The earliest botanical notice of the vanilla is by Clusius, in his *Exoticorum Libri Decem*, published in 1605. This author had received fruits from Morgan, apothecary to Queen Elizabeth, in 1602, which he described as " Lobus oblongus aromaticus " (p. 72), without being aware of their native country or use. He describes them as 6 to 8 inches long by half an inch broad, and terete, from which it is evident that they belonged to the true Mexican *Vanilla* (*V. planifolia*).

In 1651 a figure was given by Hernandez in his *Nova Plantarum Mexicanorum Historia* (p. 38), under the name of *Araco aromatico*, which shows both the characteristic growth and fruits of the plant, the flowers not being represented. The original of this figure was one of a series of 1200 executed at great cost in Mexico, by order of the King of Spain, during the previous century. Hernandez only mentions its use as a drug and gives its native name as "Tlilxochitl."

Piso in his *Mantissa Aromatica*, published in 1658, appears to have first put the name Vaynilla on record, and also its use as an ingredient in the manufacture of chocolate (pp. 200, 201). He describes it as the fragrant siliqua or pod of the *Araco aromatico* of Hernandez, and that it was called Vaynilla by the Spaniards, who added it to chocolate, not only on account of its fragrance but because of its medicinal virtues. The name is the diminutive of the Spanish *vaina*, a pod or capsule.

In 1675 Redi figured the pod and seeds, the latter as seen under the microscope (*Experimenta*, p. 179). He called it Vainiglias.

Dampier next furnished some important information about the plant. Speaking of the coast of the Bay of Campeachy, South Mexico, under date 1676, he remarks :—"Here are great plenty of Vinellos," (*Voyages*, II., pt. 2., p. 123). And at Boca-toro, in Costa Rica, which he visited in 1681, he observed :—"There grow on this coast Vinelloes in great quantity, with which Chocolate is perfumed" (I., p. 38). At a place called Caibooca in the former locality, Dampier remarks :—"We found a small Indian village, and in it a great quantity of Vinello's drying in the sun. The Vinello is a little Cod full of small black seeds; it is 4 or 5 inches long, about the bigness of the stem of a Tobacco leaf, and when dried much resembling it: so that our Privateers at first have often thrown them away when they took any, wondering why the Spaniards should lay up Tobacco stems. This Cod grows on a small Vine, which climbs about and supports itself by the neighbouring trees: it first bears a yellow Flower, from whence the Cod afterwards proceeds. It is first green, but when ripe it turns yellow; then the Indians (whose manufacture it is, and who sell it cheap to the Spaniards) gather it, and lay it in the sun, which makes it soft; then it changes to a Chestnut colour. Then they frequently press it between their fingers, which makes it flat. If the Indians do anything to them beside, I know not, but I have seen the Spaniards sleek them with Oyl" (I., p. 234). He further remarks that the Vines grow plentifully at Boca-toro, where he had gathered and tried to cure them but without success, and that he had never met with a Spaniard who could tell him, which led him to think that the Indians had some secret. "Could we have learnt the art of it, several of us would have gone to Bocca-toro yearly, at the dry season and cured them, and freighted our vessel. We there might have had Turtle enough for food and store of Vinello's . . . . They are commonly sold for 3 pence a Cod among the Spaniards in the West Indies, and are sold by the Druggist, for they are much used among Chocolate to perfume it. Some will use them among Tobacco, for it gives it a delicate scent. I never heard of any Vinello's but here in this Country, about Caibooca and at Bocca-toro" (I., p. 235).

The preceding accounts all clearly refer to the true Mexican *Vanilla* (*V. planifolia*), but in 1796 both Plukenet and Sloane introduce confusion into the records. The former includes the above under his "Vanillia's Piperis arbori Jamaicensis innascens" (*Almagest. Bot.*, p. 381), though figuring the true plant (t. 320, fig. 4). The latter, while retaining Clusius' original name, and citing the above references, records it as growing spontaneously in the woods of Jamaica about Aqua-alta (*Cat. Pl. Ins. Jam.*, p. 70). In his *Natural History of*

Jamaica, published in 1707, he further observes:—"It is said by several that they grow in this island about Aqua-alta, and that before the felling of timber and clearing ground, they were common in the shady bottoms of the inland parts of this island." (I., p. 180), so that it was evidently included on hearsay evidence, and probably the indigenous *V. inodora* (*V. anaromatica*, Griseb.) was mistaken for *V. planifolia*.

In 1703, Plumier briefly defined the genus *Vanilla* and three species from the West Indies (*Nov. Pl. Amer. Gen.*, p. 25), namely:—"V. flore viridi et albo, fructu nigrescente; V. flore albo, fructu breviori, corallino"; and "V. flore violaceo, fructu breviori, rubro." The first is figured at t. 28 (also later in his *Plantarum Americanarum*, II., p. 183, t. 188), and is certainly *V. inodora*. Of the second, a capital figure exists in his MSS. drawings, proving it to be *V. phæantha*. The third is a complete mystery, for while the other two are both figured and described in detail in his MSS. works, this is only mentioned in the following note:—"Reperitur alia species huic prorsus similis cujus tamen flores rubedine violacea splendent, fructu tandem breviores et rubri." This third species evidently does not belong to the genus. This was the first record of the flowers, but curiously enough no mention is made of the Mexican plant or its uses—merely the brief note that Vanilla is the name by which the plants are known to the Spaniards.

In 1705 Merian figured the fruiting branch of a Surinam species, calling it the greatest sort of Banille (*Metamorph. Insect. Surinam.*, t. 25). This is evidently *V. Pompona*, but in the text it is confounded with other species, as in previous records. A second sort, however, is said to grow in Surinam, which may have been *V. inodora*.

The Mexican Vanilla was, as already observed, introduced to England very early in the seventeenth century. The second volume of Miller's *Gardeners' Dictionary* appeared in 1739. There the author remarked that he had some branches of the plant, gathered by Mr. Robert Millar at Campeachy, and sent between papers by way of sample, and as the stems appeared fresh, though gathered at least four months, he planted them in small pots and plunged them in a hotbed of tanner's bark, where they soon put out leaves and roots. It is probable that they were soon afterwards lost.

Shortly afterwards Catesby gave a good coloured figure of *V. inodora*, including flowers and fruit, but in his remarks completely confounded it with the true economic plant.

Thus three distinct species had become confused together, and these are all included by Linnæus, in his *Species Plantarum*, in 1753, under the name of *Epidendrum Vanilla* (p. 952).

In 1775 Aublet published an account of the Vanilla (*Hist. Pl. Guian. Franç.* II., *Mem.* 4, pp. 77–85), remarking that in Cayenne there were three kinds of vanilla, known as Great Vanilla, Little Vanilla, and Long Vanilla. The first is *V. Pompona* and the last *V. inodora*, but the Little Vanilla is somewhat doubtful. He describes the pods as about 3 inches long by 1½ thick. *V. phæantha* has not so stout a pod, and is not known from Guiana, otherwise it best agrees with the description. Although instructions for cultivating the plant and preparing the fruit are given, it is evident that Aublet knew very little of the different species, as he says that the fruits of all the three kinds are susceptible to the same treatment, acquire the same odour, more or less sweet, and may be put to the same use.

In 1799 Swartz re-established Plumier's genus *Vanilla*, enumerating two species, *V. aromatica* and *V claviculata* (*Nov. Act. Soc. Sc. Upsal.*, VI., p. 66). The former was based on *Epidendrum Vanilla*, L., and on Plumier's figure, which latter represents *V. inodora*, whose fruits are not aromatic, so that the name was evidently taken from the vanilla of commerce. *V. claviculata* is a leafless West Indian species.

In 1807, Salisbury figured and described a species of *Vanilla* under the name of *Myobroma fragrans* (*Paradisus Londinensis*, t. 82), which he stated to be the "*Vanilla flore albo fructu breviore corallino*" of Plumier, figured in that author's unpublished drawings, and to be certainly different from the vanilla of commerce (then supposed to be produced by *V. aromatica*). The species was said to be in several collections, but only to have flowered in that of the Right Hon. Charles Greville.

The following year Andrews figured and described this same plant, from the Right Hon. C. Greville's collection at Paddington, under the name of *Vanilla planifolia* (*Botanists' Repository*, VIII., t. 538). He cites the same synonym of Plumier as did Salisbury, yet most unaccountably states that the latter had confounded it with *V. aromatica*, Swartz, the fact being just the reverse, as has been shown above. The plant is said to have been introduced by the Marquis of Blandford.

Both authors, however, erred in identifying the plant with Plumier's, which is the short podded *V. phæantha*, Rchb. f. Although neither Salisbury nor Andrews mention the fruit, the flowers leave no doubt as to what was the plant they intended, and thus its Mexican origin is clear. Whether it came from there direct or was then cultivated in the West Indies is doubtful, but the interesting point is that these are the first representations of the flowers of the Vanilla of commerce, though the fact was not known until afterwards.

In 1811 Humboldt published an account of the Vanilla (*Voyage de Humboldt et Bonpland*, pt. 3. vol. II., p. 437), in which he remarked that he had observed pods of vanilla, of extraordinary size and very aromatic, in various parts of Venezuela, in the province of Jaen on the Upper Amazon in Peru, and in various parts of Guiana, but these probably belonged to *V. Pompona* and in some part to some allied and imperfectly known species. As regards the vanilla of commerce he gave some precise information, stating that the whole of it was obtained from the districts of Vera Cruz and Oaxaca, in Mexico. Here the plant abounded between the 19th and 20th parallels of latitude, and the fruits were collected by the natives, but the harvest was attended with some difficulty on account of the large area to be traversed, and they had already begun to propagate the plant, so as to have a larger quantity in a limited space. The wild vanilla or "Baynilla cimarona" gave a very dry fruit, and in small quantity, and was never planted. The natives of Misantla collected in the forests of Quilate the fruits of a vanilla, called "Baynilla de acguales," which was difficult to dry because of its large size and more watery nature. The plant flowered in February and March, and the cutting commenced in March and April, and continued until June. This may have been the *Vanilla Pompona*, which he afterwards mentions as having fruits very large and very good. At least six kinds of commercial Vanilla are mentioned, all but one apparently produced by *Vanilla planifolia*, the other by *V. Pompona*.

In 1825 Blume described *Vanilla viridiflora* (*Bijdr.*, p. 422) from a plant which flowered in the Botanic Garden at Buitenzorg, which had been introduced from America, and Prof. Charles Morren succeeded in tracing this back to the source whence Salisbury's and also Andrews's plant was derived (*Ann. Nat. Hist.*, ser. 1, III., p. 4). It appears that

M. Parmentier of Enghien obtained plants from the collection of the Right Hon. C. Greville in 1812, which were confided to the care of Dr. Sommé, the Director of the Botanic Garden at Antwerp. There it grew rapidly, "and slips were sent to all the towns of Belgium and France, but they very rarely flowered; once or twice in Flanders at the seat of Madame la Vicomtesse Vilain XIV., and at Liege; but fruit was never obtained." In 1819 Dr. Sommé sent two plants to M. Marchal for the Dutch colonies of Java, one of which the latter, by unremitting attention on the voyage, succeeded in saving, and gave to the Botanic Garden at Buitenzorg, being without doubt the one which Blume afterwards described. It, however, failed to fruit there.

In 1829 Dr. Schiede published four species of *Vanilla* which he met with in his travels in Mexico in 1820, under the names of *V. sativa*, *V. sylvestris*, *V. Pompona*, and *V. inodora* (*Linnæa*, IV., pp. 573–574). *V. sativa* he stated to be the "Baynilla mansa" of the Mexicans, and to have esulcate fruit. It grew spontaneously in the districts of Papantla, Misantla, Nautla, and Colipa, and was also sometimes cultivated. *V. sylvestris* was called "Baynilla cimarona," and had bisulcate fruit. It grew at Papantla, Nautla, and Colipa. *V. Pompona* was called "Baynilla Pompona," and had very large bisulcate fruit. It grew at Papantla and Colipa. *V. inodora* was called "Baynilla de puerco," and had bisulcate inodorous fruit. It was found at Misantla. He had not seen flowers of any of them. *V. sativa* and *sylvestris* he thought had probably hitherto been confounded under the name of *V. planifolia*, but as their difference in commerce was of importance he had given separate names, "although," he remarks, "the transitions have not escaped us." *V. sativa* was everywhere esteemed as the best, and was alone the subject of cultivation. Only at Papantla was *V. sylvestris* gathered beside it. A kind called "Baynilla mestiza" was nothing but a kind intermediate between the two, even in form as well as quality. *V. Pompona* was abundant in ethereal oil, and had an excellent scent, but did not admit of being dried in a sufficient degree to admit of its being sent to Europe, always keeping doughy, for which reason it was not an article of trade. *V. inodora* was perfectly useless, on account of the entire want of ethereal oil. A kind known as "Vanilla de mono" he had never seen. The vanilla villages were Papantla, Misantla, Colipa and Nautla, the first producing the greatest quantity, but being behind the others in that they collected a great deal of *V. sylvestris* and mixed *V. sativa* with it; also that they gathered them before they were perfectly ripe. The vanilla harvest commenced in December and continued on into March, being almost the exclusive employment of the Indians, who went out daily into the woods where the plants grew wild, or where they had plantations, taking their daily gatherings to the purchasers, who separated them according to their different kinds and qualities.

Between 1830 and 1838 Bauer and Lindley's *Illustrations of Orchidaceous Plants* appeared, and we find plates 10 and 11 of the *Genera* devoted to the structure of flowers and fruit of *Vanilla planifolia*, Andr., "drawn by Mr. Bauer in 1807." This is the first evidence of the production of fruit in Europe, and as the drawing was made in the same year as Salisbury's figure appeared, it is practically certain that it was made from the very same plant. How the flower became fertilised is not mentioned, perhaps accidentally or by some insect. Morren suggests that the fruit was drawn from a specimen of commerce, but the colour, the uniformly plump texture, and the fact that it is attached to the rachis, all show the contrary; quite apart from the fact that the vanilla of commerce was then thought to be produced by another species, *V. aromatica*, which even Morren states that he sought for in vain in the gardens of London and its environs, and at Kew, and wrongly supposes it to be the plant cultivated by Miller in 1739. Morren is also wrong in stating that the "Vanilla planifolia (?)" of Lindley's Herbarium is "the very same plant drawn in flower by Mr. Francis Bauer," for it came from a Botanic Garden near Moscow, as the ticket "ex horto Gorenkensi" proves.

To Professor Charles Morren, of Liége, belongs the credit of first producing fruits in quantity, and of proving that *V. planifolia* was the source of the true vanilla of commerce. By a particular method of treatment adopted he succeeded in obtaining 54 flowers on one plant, and these he fertilised artificially, and obtained the same number of pods. The following year a crop of about 100 pods was obtained from another plant by the same method. His paper, "On the production of Vanilla in Europe," was read before the British Association at Newcastle, in 1838, and published in the following year (*Ann. Nat. Hist.*, ser. 1, III., pp. 1–9). He also succeeded in tracing his plant back to the one which originally flowered in the collection of the Right Hon. C. Greville, and also its introduction to Java, as has been already pointed out. Thus Morren first proved the necessity of artificial fertilisation, and he attributed its not bearing fruit in the East Indies to the absence of the species of insect which doubtless existed in Mexico, and there fertilised the flowers. He also suggested that vanilla might be produced in intertropical colonies, and also in European hothouses, by artificial fertilisation. Deltiel states that artificial fertilisation was first practised by Neumann, in 1830, in the Jardin des Plantes, but Morren makes no mention of it. In 1845 Blanco described a species of *Vanilla* from the Philippines, which he had received from his friend Azaola under the name of *V. majaijensis* (*Fl. Filip.*, ed. 2, p. 593), but it has since been referred to *V. planifolia*, and thus, if the determination is correct, it may have been at some time introduced from Mexico by the Spaniards. Blanco describes the pod as not aromatic, but it may not have been mature when he received it.

In 1872 M. Deltiel published an account of the cultivation of vanilla in Réunion, and showed that, although several different species had been introduced, the only one cultivated on account of its fruit was *V. planifolia*, which yielded the vanilla of commerce. In 1819 the Great Vanilla (evidently *V. Pompona*) was introduced from Cayenne, by Commandant Philibert, but was never an object of extended culture. A year later, a species was introduced from the Philippines by M. Perrotet, with a more slender and more aromatic fruit, but is said to have soon afterwards perished. Two years later M. Marchant obtained plants from Paris, and to this third introduction the present industry in Réunion owes its origin. Judging by the history of the vanilla grown on the Continent about this period it is pretty certain that the plants thus introduced from France were originally derived from the one in the collection of the Right Hon. C. Greville, whose history has already been given. The Philippine plant alluded to may have been the one described by Blanco, which has since been referred to *V. planifolia*. Deltiel records that the plants introduced into Réunion proved sterile until a slave named Edward Albius, about 1841 or 1842, discovered a simple and rapid method of fertilising the flowers artificially, which has been practised ever since. He also states that in Mexico and Guiana fertilisation is effected by small bees, belonging to several species of the genus *Melipone*, which visit the flowers for the honey they afford.

Mr. Morris states that the *Vanilla planifolia* is a native of British Honduras, and fine masses of it are found in the forest, hanging down from the trees, which, when the fruit is ripe, diffuses a fragrance perceptible at a considerable distance. The insect which fertilises the flowers is also present, as is proved by the number of bunches on the wild plants, which at present (1883) are allowed to rot on the vines and run to waste, though, if gathered and properly cured, a considerable trade might be made in them. (*British Honduras*, p. 81.)

25. **Vanilla planifolia**, *Andr.*, *Bot. Rep.*, VIII. (1808), t. 538.—A tall climber, with very long somewhat flexuose succulent green stems, and slender flexuose or twining white aerial roots opposite to the leaves. Leaves subsessile, oblong, acute or shortly acuminate, succulent, bright green, 4–9 in. long, 1½–2½ in. broad. Racemes axillary, 2–3 in. long, succulent. Bracts numerous, spirally arranged, oblong, subacute or obtuse, concave or conduplicate, 2–6 lin. long, gradually diminishing upwards. Pedicels 1½–2 in. long, green. Sepals and petals linear-oblong, subobtuse, 2 in. long, light glaucous green. Lip trumpet-shaped, a little shorter than the sepals and petals and of the same colour, united to the sides of the column to near its apex, and then convolute round it, apex three-lobed, mid lobe longer and retuse, margin revolute and denticulate, nerves carinate, and those in front densely crenulate-verruculose, buff yellow; disc with a tuft of retrorse hairs about the middle. Column clavate, 1⅓–1¼ in. long, hairy on the face. Capsule elongate-linear, obscurely trigonous, 6–9 in. long, 6–7 lin. broad.—*R. Br. in Ait. Hort. Kew*, ed. 2, V., p. 220; *Lodd. Bot. Cab.*, VIII., t. 733; *Bauer Ill. Orch.*, *Gen.*, t. 10, 11; *Blume Rumphia*, I., p. 197, t. 68, fig. 2; *Lindl. Gen. & Sp. Orch.*, p. 435; *C. Morr. in Ann. Nat. Hist.*, ser. 1, III., p. 1; *De Vriese in Belg. Hort.*, VI., pp. 315, 365; *Bentl. & Trim. Medic. Pl.*, IV., t. 272 (*excl. syn.*); *Flück. & Hanb. Pharmacogr.*, p. 595; *Gard. Chron.*, 1867, p. 997; 1888, I., p. 562; *Bot. Mag.*, t. 7167; *Cogn. in Mart. Fl. Bras.*, III., pt. 4, p. 145.

Habitat.—South-eastern Mexico, in the Vera Cruz district, Misantla, Schiede! and Yucatan (Schott., n. 215!); also in British Honduras, Guatemala (Lehmann, n. 436!); and Costa Rica. Cultivated in the Mascarene Islands, Java, the West Indies, and other parts of the tropics.

Epidendrum Vanilla, *L. Sp. Pl.*, ed. 1., p. 952 (partim).

Vanilla mexicana, *Mill. Gard. Dict.*, ed. 8 (1761), n. 1 (partim).

Vanilla aromatica, *Sw. in Nov. Act. Upsal.*, VI. (1799) *et in Schrad. Journ.*, II., p. 208 (partim); *Lindl. Gen. & Sp. Orch.*, p. 434 (partim).

Vanilla Epidendrum, *Mirb. Hist. Pl.*, ed. 2, IX., p. 249 (partim).

Myobroma fragrans, *Salisb. Parad. Lond.*, t. 82.

Vanilla viridiflora, *Blume Bijdr.*, p. 422.

Vanilla sativa, *Schiede in Linnæa*, IV., p. 573; VI., p. 59; *Lindl. Gen. & Sp. Orch.*, p. 437.

Vanilla sylvestris, *Schiede in Linnæa*, VI., p. 573; VI., p. 59; *Lindl. Gen. & Sp. Orch.*, p. 437.

Vanilla majaijensis, *Blanco Fl. Filip.*, ed. 2, p. 593.

This species produces the true Mexican vanilla of commerce, which has been known ever since the discovery of America by the Spaniards, and which was described by Clusius as long ago as 1605 under the name of *Lobus oblongus aromaticus*. Its early history is much confused, as for a long period three or four species were confounded together, and even when the present one was described it was not known as the source of the vanilla of commerce, which was then and for long afterwards thought to be *V. aromatica*, Sw. (*i.e.*, *V. inodora*, Schiede). It was introduced to cultivation about the year 1739, but was probably soon afterwards lost. The Marquis of Blandford re-introduced it about the beginning of the present century, and it flowered in the collection of the Right Hon. Charles Greville at Paddington in 1807, whence it can be directly traced to various Continental gardens, to Java, where Blume re-described it under the name of *V. viridiflora*, and to Réunion, thus originating the present industry in that island. *Myobroma fragrans*, Salisb., was drawn from the same individual as the original *Vanilla planifolia*, Andr. *V. sativa* and *V. sylvestris* of Schiede are chiefly known from the original descriptions, but are evidently forms of the same species, differing only a little in the length of the fruit, the former being a cultivated race, and the latter the wild original. *V. majaijensis*, Blanco, is also known only from description, and as the fruit is said to be not aromatic, a doubt remains as to its identity. Succeeding authors, however, have considered it synonymous with the present one, and if Blanco's fruits were unripe this view may be correct, in which case it seems probable that the species was introduced to the Philippines from Mexico by the Spaniards. Naves (*Blanco Fl. Filip*, ed. 3, Nov. App., p. 248) enumerates it as growing in the provinces of San Mateo, where he had seen flowers and fruit, and a confirmation of the identification seems desirable.

26. **Vanilla phæantha**, *Rchb. f. in Flora*, XLVIII. (1865), p. 274.—General habit of the preceding. Bracts fewer and larger, broadly elliptical-oblong, subobtuse, 3–7 lin. long, 2–4 lin. broad. Flowers larger, pedicels green; sepals and petals 2¼–2¾ in. long, greenish-yellow. Lip greenish-yellow, whitish in the throat, apex obscurely three-lobed and nearly truncate, nerves not carinate in front, disc with a pair of hairy lines extending from the central tuft of hairs towards the base. Capsule linear-oblong, obscurely compressed, 3 in. long, ½ in. broad.

Vanilla planifolia, *Griseb. Fl. Brit. W. Ind.*, p. 638 in part, *non Andr.*
Vanilla planifolia, β. macrantha, *Griseb. Cat. Pl. Cub.*, p. 267.

Habitat.—West Indies, Cuba, *Wright*, n. 3351 (in part)! St. Vincent, *Guilding!* in virgin forest between Mt. St. Andrews and the Grand Bonhomme at 2000 feet alt., *Smith!* Trinidad, *Hart!*.

This is an indigenous West Indian species, which has been confused with *Vanilla planifolia*, Andr., though it is easily distinguished by its much larger flowers, lip without verrucose disc, and its much shorter fruit. Mr. Hart states that it is indigenous in Trinidad, and that the fruit has little perfume, and Messrs. Smith remark that in St. Vincent they only observed it in a limited space but in virgin forest. It is cultivated in the Botanic Gardens of Jamaica and Trinidad, but there is no evidence of its fruits being of any commercial value. Wright's Cuban specimen at Kew, and also at the British Museum, is confounded with the leafless *V. barbellata*, Rchb. f., a fruiting specimen of each being attached to the same sheet, with a single ticket.

27. **Vanilla Pompona**, *Schiede in Linnæa*, IV. (1829), p. 573.—General habit of *V. planifolia*, but leaves larger, 6–11 in. long, 1½–4½ in. broad. Bracts larger, broadly elliptical-oblong, 5–7 lin. long, 3–4 lin. broad. Flowers larger and rather more fleshy; pedicels yellow-

green; sepals and petals 3–3½ in. long, greenish-yellow. Lip bright yellow, nerves somewhat thickened, central tuft consisting of descending imbricating scales rather than hairs. Capsule linear-oblong, strongly trigonous, 6–7 in. long, 1–1¼ in. broad.—*Lindl. Gen. and Sp. Orch.*, p. 437; *Klotzsch in Bot, Zeit.*, IV., p. 566; *Desv. in Ann. Sc. Nat.*, sér. 3, VI., p. 120; *Cogn. in Mart., Fl. Bras.*, III., pt. 4, p. 147.

Vanilla grandiflora, *Lindl. Gen. and Sp. Orch.* (1840), p. 435.

Vanilla guianensis, *Splitg. in Ann. Sc. Nat.*, sér. 2, XV. (1841), p. 279 (partim); *De Vriese in Tuinb. Fl.*, III., pp. 78, 81, t. 6 (partim); *Cogn. in Mart. Fl. Bras.*, III., pt. 4, p. 151 (partim).

Vanilla lutescens, *Moq. ex Dupuis in Rev. Hort.*, sér. 4, V. (1856), p. 121, fig. 24; *id. in Bull. Soc. Bot. de Fr.*, III., p. 354; *Duchartre in Journ. Soc. Imp. d'Hort,*, V., p. 97, t. 11; *Fl. des Serres*, XXI., t. 2218.

Vanilla surinamensis, *Rchb. f. in Nederl. Kruidk. Arch.*, IV. (1859), p. 321 (partim).

Habitat.—S.E. Mexico, Papantla and Colipa, *Schiede!* Valley of Cordova, *Bourgeau*, n. 2332! Nicaragua, Segovia, *Œrsted!* Panama, *Seemann*, n. 1159! Columbia, Lower mountains of Santa Martha, *Purdie!* Tolima, bei La Plata, 800–1500 m. alt.: *Lehmann*, n. 2263! Venezuela, at La Guayra; Trinidad; *Bradford*, n. 5285! *Hart!* British Guiana, Corentyne River, *Im Thurn*; Surinam, *Merian*; Cayenne, *Aublet.*—Cultivated in Martinique, Guadeloupe and possibly other localities.

This species is much more widely diffused than *Vanilla planifolia*, and its fruit has long been known as an article of commerce, being now usually sold under the name of West Indian Vanillons. It is the "Grosse Vanille" of Aublet, the "Baynilla de acguales" of Humboldt, and the "Baynilla Pompona" of Schiede. The pods are much thicker and more fleshy than those of *V. planifolia*, and more difficult to dry. They also fetch a much lower price in the market, but the fresh fruits are largely used in the same way as those of *V. planifolia*.

28. **Vanilla Gardneri**, *Rolfe;* caulibus crassiusculis, foliis subsessilibus oblongis obtusis crassiusculis, racemis crassiusculis brevibus, bracteis ovatis obtusis rigidis patentibus, sepalis petalisque lineari-lanceolatis subobtusis, labello oblongo subintegro obtuso submembranaceo nervo vix incrassato, disco subpubescente cristato, columna clavata, capsula ignota.

Vanilla planifolia, *Gardn. in Hook. Lond. Journ. of Bot.*, I., p. 542, *non Andr.; Travels in Brazil*, ed. 2, p. 225.

Habitat.—Brazil, in dry rocky bushy places, common, as on the Morra do Flamengo, near Rio, *Gardner*, n. 245! in moist places in the district of Parnagua, prov. Piauhy, *Gardner*, n. 2733! Natividade, prov. Goyaz, *Gardner*, n. 3449! Pernambuco, at Iguarassa; *Ridley, Lea and Ramage!* *Burchell* n. 894 from near Rio, and n. 9829 from San José da Laranjeira, Pará, may represent barren branches of the same. The latter is marked as "*Bahunilha.* Fructus teres, 4–5 poll."

Folia 3–5 poll. longa, 1¼–1½ poll. lata. *Racemi* 1½–3 poll. longi. *Bracteæ* 3–5 lin. longæ. *Pedicelli* ¾–1½ poll. longi. *Sepala* et *petala* 2¾ poll. longa. *Labellum* 2½ poll. longum. *Columna* 1½ poll. longa.

A species allied to *Vanilla Pompona*, Schiede, but with leaves about half the size, longer racemes with smaller not reflexed bracts, and rather smaller more membranaceous flowers. Gardner confounded it with *V. planifolia*, Andr., and remarked, "This is the plant which yields the Vanilla (Banilha of the Brazilians) in Brazil," (*Hook. Lond. Journ. of Bot.*, I., p. 542) though unfortunately his specimens are without fruit. There are pods in the Kew Museum labelled "Brazilian or Bahia Vanilla," which are 5½ inches long by fully 1 inch broad, fleshy, and distinctly triquetrous, and thus approaching those of *V. Pompona*, but with a rank odour. These are probably produced by the present species. "South American Vanilla" (*Kew Bulletin*, 1892, p. 214) may also have the same origin. They are described as from 6½ to 7½ inches long, quite broad and flattened, ½ inch or more wide, reddish-brown, and the odour rank, somewhat resembling fermented molasses or rum. As much as 9000 lbs. of the beans are said to have been produced in 1891, and it is suggested that it is most likely used as an adulterant of the Mexican cut beans. Flowering and fruit specimens of the commercial plant are required to settle these doubtful points.

33. **Vanilla appendiculata**, *Rolfe;* caulibus crassiusculis, foliis breviter petiolatis oblongis v. elliptico-oblongis breviter et abrupte acuminatis subobtusis, racemis crassiusculis brevibus, bracteis oblongis obtusis, sepalis petalisque lanceolato-linearibus acutis labello oblongo subtrilobo, lobis lateralibus obtusis, intermedio anguste oblongo recurvo nervis appendicibus longis linearibus ornatis, disco medio appendicibus foliaceis cuneato-obovatis dentatis ornato, capsula angusta elongata.

Habitat.—British Guiana, Corentyne River, *E. F. im Thurn.!*

Folia 3¼–4½ poll. longa, 1–1½ poll. lata. *Racemi* 1–1½ poll. longi. *Bracteæ* 3–6 lin. longæ. *Sepala* et *petala* 2¼ poll. longa. *Labellum* 2 poll. longum. *Columna* 1½ poll. longa. *Capsulæ* 4½ poll. longæ.

Remarkable for its narrow sepals and petals, and long narrow lip which terminates in a narrow recurved apex covered with linear foliaceous appendages. The specimens were gathered in 1879, and both the fruits have opened, yet they retain a distinct aromatic perfume, though whether the species has any economic value is uncertain.

37. **Vanilla odorata** *Presl Rel. Haenk.* (1830), p. 101. Leaves shortly petiolate, linear-lanceolate, acute, 5–7 in. long., 6–8 lin. broad. Raceme short. Capsule sessile, linear-lanceolate, attenuate at apex and base, 6–7 in. long, aromatic.—*Klotzsch in Bot. Zeit.*, IV., p. 563.

Habitat.—Ecuador; Guayaquil, *Haenke.*

Only known from description. Presl remarks that although the fruits had been collected 36 years they still retained their aromatic fragrance.

CCCCLXVIII.—DISEASE OF PEPPER PLANTS IN MYSORE.

(*Piper nigrum*, L.)

The black pepper of commerce is the small pea-like fruit of a climbing plant, native of the East Indies, and cultivated in Southern India, the Malay peninsula, and the Eastern Archipelago. The skin or rind of the fruit is first red, and then dries of a black colour. White pepper is the ripe fruit deprived of its rind by maceration. There is no other difference between them. About 30 million pounds of pepper are imported into the United Kingdom every year. An appeal has just been made to Kew by a pepper planter in Southern India respecting a disease which has broken out in Mysore. The disease, singularly enough, is closely allied to that causing serious damage to vines and orchard trees in Europe—*Dematophora necatrix.* It is hoped that the simple and effective means here suggested for the treatment of the disease will enable the pepper planters in Mysore to combat an enemy that threatens to seriously injure their industry :—

Mr. J. S. Middleton to Royal Gardens, Kew.

24, Augusta Road, Ramsgate,
27th July 1895.

Dear Sir,

I am very much interested in pepper-growing in Mysore, Southern India, but unfortunately a blight attacks the vines, very often as they are coming into bearing. It is not the pepper alone that is attacked, but even the saplings or undergrowth of the forest trees, which spring up very rapidly, suffer also. All over the plantation, at various points, this disease attacks these young saplings in patches of from 5 to 10 or 15 yards square, and I may say kills them off outright. This has led me to think it must be of a fungoid nature, though I cannot pretend to any scientific knowledge on the subject.

As regards the pepper vines, most are attacked at the roots, though some are attacked a few feet from the ground, and very soon afterwards the vine dries up, having infected most of the other vines in the neighbourhood. I have tried coal tar mixed with water, and paraffin oil also mixed with water, all to no purpose, but I have found great benefit from the application of fires, lighted in large numbers throughout the affected parts, though a great number of the young vines get scorched and die afterwards.

I have taken the liberty of sending a few specimens of diseased plants, and will be glad to come to you personally to give all the information I can, if you will kindly undertake to investigate the subject.

Believe me, &c.
(Signed) J. S. Middleton.

Diseased Pepper Plants from Mysore.

The disease is caused by an undescribed fungus closely allied to the one called *Dematophora necatrix,* which causes such damage in vineries and orchards in Europe by destroying the roots of the trees.

The material sent shows that the pepper fungus can reproduce itself by three different methods. (1.) The most general form, and the only one when the disease spreads from a centre, is by mycelium, or spawn, which travels in the soil, spreading from plant to plant, and destroying the roots.

When such centres of disease are noted, they should be at once isolated by digging a narrow trench about 10 inches deep round the diseased patch, thus preventing the outward spread of the mycelium, which cannot pass the trench.

As there is no cure for plants when the roots are attacked, it would be best to remove and burn all plants within the infected area, otherwise the diseased plants will form a centre of infection by another method.

(2.) If the stem of a plant that has been diseased at the root for some time is examined, very minute black lumps just visible to the naked eye will be seen scattered over the surface, and, in addition, small black, velvety patches are also very frequently present; these are two distinct fruiting conditions belonging to the fungus, each of which produces myriads of conidia or very minute reproductive bodies which are dispersed by wind and inoculate other plants. By this method plants become diseased above ground, the roots remaining healthy.

Nothing short of prompt destruction by burning of all plants showing such black lumps or velvety patches can prevent the spread of the disease by diffusion of the conidia.

As conidia are dispersed mostly by very low, earth currents of air, screens of branches might with advantage be erected between the plantation and the infected forest region.

The benefit derived from the fires to which allusion is made is explained by the fact that each fire forms a vortex through which a certain volume of spore-laden air passes, and is purified.

When the root form of the disease has shown itself, it is useless to plant again on the same spot before the soil has been thoroughly sterilized; lime, if available will effect this; wood ashes is also good for the purpose.

Finally, great care should be taken in the selection of perfectly healthy (that is, disease-free) portions of the plant for purposes of propagation. No portion of any plant showing the disease at any part should be used, for although portions of such plants may present no external indications of disease, yet, in all probability, the tissues of every portion contain mycelium which at a later stage will grow out and show the disease. In many parallel cases, where root disease is the trouble, the disease is in reality fostered by the planting of diseased cuttings.

G.M.

CCCCLXIX.—DECADES KEWENSES.

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECADES XX. & XXI.

With a few exceptions, the plants of the two following decades are from the collection made by Mr. J. Theodore Bent on his second journey in Arabia Felix. Some particulars of the collection will be found at p. 158.

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191. **Ionidium durum,** *Baker* [Violaceæ]; suffruticosum, ramulis lignosis albidis junioribus pubescentibus, foliis ad nodos fasciculatis obovatis integris vel obscure crenatis basi cuneatis sessilibus vel subsessilibus firmulis margine recurvatis utrinque viridibus obscure pubescentibus, stipulis deltoideis albidis integris persistentibus, floribus axillaribus solitariis breviter pedicellatis, sepalis ovatis viridibus albo-marginatis, petalis albis calyce 4–6 plo longioribus.

Habitat.—South-east Arabia: Dhofar Mountains at 2000 ft., *J. T. Bent,* 132.

Folia 2–3 lin. longa. *Sepala* ½ lin. longa. *Petala* 2½–3 lin. longa.

192. **Polygala dhofarica,** *Baker* [Polygalaceæ]; herbacea, perennis, glabra, caulibus brevibus ramosis, foliis lineari-oblongis obtusis subsessilibus firmulis utrinque viridibus junioribus pubescentibus adultis calvatis, floribus in racemis multifloris terminalibus dispositis axi pubescente, pedicellis brevibus, bracteis oblongis minutis deciduis, sepalis exterioribus parvis oblongis interioribus magnis orbicularibus albis venis multis viridibus anastomosantibus, petalis sepalis interioribus brevioribus, fructu obovato emarginato distincte alato sepalis interioribus æquilongo.

Habitat.—South-east Arabia: Dhofar Mountains at 300 ft., *J. T. Bent*, 186.

Folia 4 lin. longa. *Sepala* interiora cum *fructu* 2½ lin. longa.

Near *P. hohenackeriana*, F. & M.

193. **Fagonia nummularifolia,** *Baker* [Zygophylleæ]; fruticosa, ramosissima, caulibus lignosis viscoso-pubescentibus, foliis petiolatis orbicularibus crassis coriaceis planis utrinque viridibus viscoso-pubescentibus, floribus paucis solitariis axillaribus brevissime pedicellatis, sepalis oblongis viridibus viscoso-pubescentibus obscure cuspidatis, petalis obovatis rubellis calyce duplo longioribus, fructu late ovoideo carpellis pubescentibus dorso acute carinatis.

Habitat.—South-east Arabia: coast at Merbat, foot of Dhofar mountains, *J. T. Bent*, 68.

Folia inferiora 6 lin. longa et lata. *Sepala* 1½ lin. longa. *Petala* 3 lin. longa. Fructus 2 lin. diam.

194. **Cassia (Senna) oocarpa,** *Baker* [Leguminosæ]; fruticosa, ramulis dense pubescentibus, stipulis ovatis parvis, foliis petiolatis griseo-viridibus pubescentibus, foliolis 6–7-jugis oblongis obtusis emarginatis basi obliquis, floribus in racemis axillaribus breviter pedunculatis dispositis, bracteis orbicularibus caducis membranaceis viridibus, petalis orbicularibus vel obovatis parvis luteis venis brunneis, legumine breviter pedicellato oblongo subrecto plano pubescente.

Habitat.—South-east Arabia: coast at Merbat, foot of Dhofar mountains, *J. T. Bent*, 69.

Folia 4–5 poll. longa; foliola 12–15 lin. longa. *Petala*, 3 lin. longa. *Fructus* 12–18 lin. longus, 8–9 lin latus.

Near *C. holosericea*, Fresen., from which it differs by its shorter nearly straight pod.

195. **Dizygotheca Reginæ,** *Hemsl.* [Araliaceæ]; arbuscula paucipedalis in horto Kewensi florens, undique glaberrima, caule simplice robusto eximie lenticellato atque petiolis inflorescentiæ ramis plus minusve intense purpura colorato, foliis amplissimis longissime petiolatis digitatim multifoliolatis, foliolis 10–15 distincte petiolulatis coriaceis angustissime elongato-lanceolatis vel sublinearibus (in plantis junioribus foliolis paucioribus angustioribus minus distincte petiolulatis) integris undulatis apice obtusis basi cuneatis supra subnitidis subtus pallidioribus, costa utrinque elevata, venis primariis lateralibus numerosis, petiolo tereto basi apiceque incrassato patente vel deflexo deinde apice incurvo, inflorescentia terminali amplissima atropurpurea ramis primariis plurimis elongatis radiatim dispositis apice bis vel ter umbellatim ramosis, umbellis

ultimis nunc radiatis nunc sparsis, pedicellis distinctis, floribus flavo viridibus, calycis limbo brevissimo fere truncato, petalis subcarnosis lanceolatis apice breviter incurvis intus carinatis, antheris distincte quadrilocularibus, ovario quinqueloculari, fructu ignoto.—*Aralia Reginæ*, Hort. Lind., André in Ill. Hort. xxvi. p. 25, t. 337.

Habitat.—New Caledonia: discovered and introduced into Europe by Mr. Pancher for Mr. J. Linden.

Caulis prope apicem circiter 1 poll. diametro. *Folia* 1–1½ ped. diametro; petioli circiter pedales, medio 3–4 lin. diametro, basi 1 poll. diametro. *Foliola* 6–12 poll. longa, maxima 8–10 lin. lata; petioluli 4–12 lin. longi. *Inflorescentiæ* rami primarii umbellas compositas gerentes 6–8 poll. longi. *Umbellæ compositæ* 5–7 poll. diametro. *Pedicelli* 3–4 lin. longi.

196. **Pluchea mollis**, *Baker* [Compositæ]; fruticosa, ramulis dense albo-pilosis, foliis parvis sessilibus obovato-oblongis obtusis integris vel obscure crenatis penninerviis utrinque griseo-viridibus molliter pubescentibus, capitulis multifloris in corymbis densis terminalibus dispositis, pedunculis brevissimis dense molliter pubescentibus, involucro campanulato bracteis pauciseriatis adpressis pubescentibus exterioribus ovatis intimis linearibus, corollis cylindricis purpureis, achæniis minutis glabris cylindricis, pappo setoso albido flexili corolla æquilongo.

Habitat.—South-east Arabia: Hafa, Dhofar, *J. T. Bent*, 9.

Folia 6–12 lin. longa, 4–6 lin. lata. *Involucrum* 2 lin. longum. *Pappus* 2 lin. longus.

197. **Pluchea laxa**, *Baker* [Compositæ]; fruticosa, ramulis obscure pubescentibus, foliis sessilibus obovato-cuneatis obscure viridibus utrinque viridibus obscure pubescentibus inferioribus parce conspicue dentatis superioribus integris, capitulis multifloris in corymbis multifloris dispositis, pedunculis ascendentibus elongatis, involucri campanulati bracteis multiseriatis adpressis imbricatis intimis linearibus exterioribus lanceolatis, corollis cylindricis purpureis, achæniis minutis glabris, pappo albido setoso flexili corolla æquilongo.

Habitat.—South-east Arabia: coast at Merbat, foot of the Dhofar mountains, *J. T. Bent*, 7.

Folia ramorum 12–18 lin. longa. *Involucrum* 3 lin. longum. *Pappus* 2 lin. longus.

198. **Carduncellus kentrophylloides**, *Baker* [Compositæ]; suffruticosus, ramulis dense persistenter albo-incanis, foliis sessilibus oblongo-lanceolatis irregulariter spinoso-serratis utrinque albo-araneosis spinis stramineis, capitulis magnis multifloris solitariis terminalibus sessilibus, involucri campanulati bracteis exterioribus adpressis spinoso-pinnatis araneosis, intimis infra spinam terminalem truncatis, corollis purpureis, pappi setis elongatis plumosis flore æquilongis.

Habitat.—South-east Arabia: Dhofar mountains, at 2600 feet, *J. T. Bent*, 192.

Folia 12–18 lin. longa. *Capitula* 9–12 lin. diam. *Corolla* 6 lin. longa.

199. **Centaurea (Calcitrapa) dhofarica**, *Baker* (Compositæ); suffruticosa, ramulis pubescentibus, foliis oblongis obtusis basi crenatis

utrinque viridibus pubescentibus, inferioribus pinnatifidis lobis oblongis superioribus caulinis integris, capitulis solitariis terminalibus, involucri campanulati bracteis rigidulis stramineis basi ovatis adpressis spinâ terminali patula pungente basi utrinque spinulis 1–2 parvis appendiculata, floribus luteis, achæniis nitidis pallide stramineis, pappi setis permultis brunneis achænio æquilongis.

Habitat.—South-east Arabia: Hafa, Dhofar, *J. T. Bent*, 35.

Folia inferiora 2 poll. longa. *Spinæ* involucrales 9 lin. longæ. *Achænia* 1½ lin. longa.

200. **Rhododendron formosanum,** *Hemsl.* [Ericaceæ]; ramulis floriferis cito glabrescentibus crassis cinereis, foliis confertis distincte petiolatis primum lanato-tomentosis cito glabrescentibus crassis coriaceis suberectis anguste oblanceolatis elongatis obtusissimis deorsum longe attenuatis margine incrassato supra subnitidis minute reticulatis costa angustissima impressa subtus cinereis costa elevata, petiolo subterete angustissime canaliculato, cataphyllis arcte imbricatis inferioribus coriaceis brevibus rotundatis ciliolatis superioribus laxis elongatis tenuibus mollibus ferrugineo-pulverulentis, floribus mediocribus racemosis racemis terminalibus vel pseudoterminalibus 7–10 floris, pedicellis longis, calyce ferrugineo-puberulo brevissimo obscure late lobato, corolla intus extusque glabra breviter lateque lobata, lobo postico emarginato, staminibus 10 inclusis, filamentis infra medium incrassatis hirsutis, ovario furfuraceo 5-loculari, stylo glabro crasso stamina superante, capsula ignota.

Habitat.—Formosa: South Cape, *A. Henry*, 1976.

Folia 3–6 poll. longa, maxima 1 poll. lata, petioli 6–12 lin. longi. *Flores* circiter 1½ poll. longi et diametro. *Pedicelli* 1–1½ poll. longi. *Stylus* circiter 1½ poll. longus.

201. **Glossonema edule,** *N. E. Brown* [Asclepiadeæ]; herba ramosa incano-pubescens, ramis alternis furcatis, foliis petiolatis rotundatis rotundato-ovatis vel ellipticis obtusis apiculatis basi obtusissimis vel late cuneatis marginibus leviter crenulato-crispatis, umbellis ad nodos lateralibus sessilibus 7–8-floris, bracteis lineari-subulatis acutis rubescentibus, pedicellis subcrassis parce pubescentibus, sepalis attenuato-lanceolatis acutis pubescentibus, corolla campanulata infra medium 5-loba lobis ovato-oblongis obtusis leviter concavis dorso valde carinatis carinis validis obtusis parce pubescentibus ceteris glabris, corona a medio corollæ tubi enata tubulosa usque ad medium 5-loba lobis ovatis obtusis intus bicarinatis, columna staminum infra medium corollæ tubi enata brevi, antheris appendiculis reniformibus obtusissimis erectis styli apice crasso clavato multo brevioribus, folliculis junioribus ellipsoideis obtusis echinatis albo-tomentosis.

Habitat.—South-east Arabia: at the foot of Dhofar mountains, *J. T. Bent*, 175.

Planta 6 poll. alta. *Foliorum petioli* 1–2½ lin. longi, laminæ 5–10 lin. longæ, 4–10 lin. latæ. *Bracteæ* 1–1½ lin. longæ. *Pedicelli* 1 lin. longi, ½ lin. crassi. *Sepala* 1¼–1½ lin. longa, ½ lin. lata. *Corolla* 2 lin. longa, lobis 1½ lin. longis, ¾ lin. latis. *Corona* 1¼ lin. longa, lobis ¾ lin. longis latisque.

Allied to *G. varians*, Benth., but the flowers are smaller, the corolla lobes have not revolute margins, and the caudicles of the pollen-masses are very much longer than in *G. varians.* According to a note on Mr. Bent's label, the flowers are green, and the plant is "eaten as salad." Probably the plant is a perennial with a tuberous rootstock.

202. **Trichodesma africanum**, *Baker* [Boragineæ]; perenne, humile, caulibus setis ascendentibus dense hispidis, foliis parvis oblongis obtusis sessilibus utrinque adpresse hispidis, floribus longe pedicellatis, sepalis floriferis cordato-ovatis cuspidatis foliaceis hispidis lobis basalibus rotundatis, corollæ limbo patulo lobis latis deltoideis haud cuspidatis, antheris dense albo-pubescentibus apicibus sterilibus productis leviter tortis.

Habitat.—South-east Arabia: Dhofar mountains, *J. T. Bent.*

Folia 6–9 lin. longa. *Sepala* florifera 6 lin. longa. *Corollæ* limbus expansus 6 lin. diam.

Near *T. indicum*, R. Br.

203. **Ipomœa (Strophipomœa) punctata**, *Baker* [Convolvulaceæ]; suffruticosa, late sarmentosa, caulibus pubescentibus, foliis longe petiolatis cordato-ovatis integris obtuse cuspidatis facie viridibus subcalvis dorso obscure pilosis nigro-punctatis, floribus solitariis axillaribus breviter pedunculatis, sepalis orbicularibus ciliatis valde imbricatis, corollæ tubo late infundibulari calyce 6–8-plo longiore, stylo corolla duplo breviore, staminibus brevibus.

Habitat.—South-east Arabia: Derbat, Dhofar mountains, *J. T. Bent*, 229.

Folia inferiora 6–7 poll. lata, petioli 4–5 pollicares. *Sepala* semipollicaria. *Corolla* 3½ poll. longa.

A very showy plant, allied to *I. Lindleyi*, Choisy.

204. **Hyoscyamus flaccidus**, *Wright* [Solanaceæ]; herbaceus, humilis, caule brevi, foliis longe petiolatis rotundatis irregulariter angulato-dentatis basi cordatis marginibus petiolisque villosis, racemo paucifloro terminali, pedunculo pedicellisque villosis, calyce campanulato extus villoso lobis 5 triangulatis, corolla alba infundibulari obliquiter 5-lobata, staminibus 5 prope basin corollæ tubi affixis, antheris dorsifixis, ovario globoso biloculari, ovulis pluribus, stylo exserto, stigmate bilobo, capsula circumscissa calyce aucto cincta.

Habitat.—South-east Arabia: Dhofar mountains, Wadi Gergio, 1500 ft. *J. T. Bent.*

Folia 2 poll. diam.; *petiolus* 1½–2½ poll. longus. *Racemus* 3–6 poll. longus. *Calyx* 4 lin. longus. *Corollæ* tubus 5 lin. longus, lobus maximus 2 lin. longus.

This approaches *H. leptocalix*, Stapf. ined., but differs in the shape of the leaves, more numerous flowers, and longer calyx tube.

205. **Orthosiphon comosum**, *Baker* [Labiatæ]; suffruticosum, ramis sursum albo-incanis, foliis subsessilibus oblongis obtusis irregulariter crenatis basi attenuatis utrinque viridibus obscure pubescentibus nigro-punctatis, racemis simplicibus terminalibus laxis, verticillastris bifloris, bracteis supremis erectis angustis coloratis persistentibus, pedicellis brevissimis albo-hirsutis, calycis tubo infundibulari pubescente dente supremo orbiculari haud decurrente dentibus inferioribus deltoideis, corollæ tubo infundibulari calyce duplo longiore labio supremo parvo oblongo inferiore

lato dentibus tribus parvis ovatis, staminibus longe exsertis, stylo apice furcato staminibus longiore.

Habitat.—South-east Arabia: Dhofar mountains at 2600 ft., *J. T. Bent*, 152.

Folia 1–1½ poll. longa. *Calyx* 2 lin. longus. *Corolla* 7–8 lin. longa. *Stamina* 15–18 lin. longa.

Near *O. stamineus*, Benth.; *Bot. Mag.* tab. 5833.

206. **Teucrium (Polium) nummularifolium,** *Baker* [Labiatæ]; perenne, ramosissimum, ramis dense persistenter albo-incanis, foliis subsessilibus vel brevissime petiolatis suborbcularibus vel inferioribus oblongis conspicue crenatis supra leviter subtus dense persistenter albo-incanis floriferis crebris reliquis conformibus, floribus breviter pedicellatis ad axillas foliorum superiorum solitariis, calycis tubo infundibulari dense piloso dentibus parvis lanceolatis, corollæ tubo calyci æquilongo labio superiore parvo orbiculari inferiore majore trilobato, staminibus labio inferiori subæquilongis.

Habitat.—South-east Arabia: Wady Gerzid, Dhofar mountains, *J. T. Bent*, 169.

Folia 3–4 lin. longa et lata. *Calyx* 2 lin. longus.

207. **Peperomia malaccensis,** *Ridley* [Piperaceæ]; succulenta, diffusa, prostrata, caulibus radicantibus obscure angulatis, foliis alternis ovatis cordatis obtusis petiolatis, petiolis obscure angulatis, laminis atroviridibus vel olivaceis, subtus argentatis, glabris (basibus minute pubescentibus exceptis), nervis 5 e sinu curvis, spicis singulis terminalibus pedunculatis viridibus glabris, floribus in rachi immersis dissitis, bracteis cuneatis apicibus oblongo-rotundatis, staminibus clavatis, ovario globoso haud rostrato, stigmate penicillato purpureo.

Habitat.—Malacca: on rocks in dense jungle woods, collected by *R. Derry*.

Folia 1½ poll. longa, 1 poll. lata, petioli ½ poll. longi. *Spicæ* 1½ poll longæ.

A curious and distinct species, remarkable for its ovate cordate leaves, which vary from dark green to coppery brown. It does not seem closely allied to any of the Indian or Malayan species, but resembles somewhat in habit *P. pachyphylla*, Miq., of the Sandwich Islands.

208. **Euphorbia (Rhizanthium) oblongicaulis,** *Baker* [Euphorbiaceæ]; radice fusiformi, caule tuberoso oblongo inermi cicatricibus foliorum delapsorum notato, foliis floribusque ad tuberis apicem dense rosulatis, foliis petiolatis lanceolatis vel oblongo-lanceolatis integris undulatis utrinque leviter albo-pubescentibus, pedunculis brevibus nudis strictis erectis simplicibus vel furcatis, involucro parvo campanulato viridi glandulis marginalibus orbicularibus integris viridulis, staminibus involucro paulo longioribus, coccis dorso rotundatis leviter pilosis, seminibus nigris glabris lævibus.

Habitat.—South-east Arabia: Rigout, Dhofar coast, *J. T. Bent*, 61, and gathered also by Lunt, on the Hadramaut expedition and brought alive to the Royal Gardens, where it flowered June 1894.

Caulis tuberosus 15–18 lin. longus, 6–9 lin. diam. *Folia* 1–2 poll. onga. *Involucrum* 1 lin. diam.

209. **Croton (Eucroton) confertus,** *Baker* [Euphorbiaceæ]; fruticosus, foliis floribusque ad apices ramorum confertis foliis oblongis obtusis integris petiolatis facie pallide viridibus tenuiter albolepidotis dorso dense persistenter albo-tomentosis, floribus monoicis in racemis densis aggregatis, masculis lobis calycinis 5 ovatis basi coalitis dorso dense pilosis, petalis parvis oblanceolatis obtusis, receptaculo dense piloso, staminibus circiter 20 e calyce exsertis, femineis apetalis, fructu magno globoso dense persistenter stellato-piloso.

Habitat.—South-east Arabia: Derbat, Dhofar, *J. T. Bent*, 231.

Caulis 9–10-pedalis. *Folia* 12–15 lin. longa. *Stamina* 4 lin. longa. *Fructus* 7–8 lin. diam.

210. **Arthrostylidium Prestoëi,** *Munro* [Gramineæ-Bambuseæ]; foliis brevibus angustis acutis subtus basin versus pubescentibus vaginis plerumque efimbriatis raro fimbriis 1–2 instructis, racemo simplice rachi cito articulatim secedente, spiculis 7–8 approximatis imbricatis subsessilibus compressis inferne glabris superne dorso et margine scabro-hirsutis. *Munro manuscript in Herb. Kew.*

Habitat.—Trinidad, *H. Prestoe.* There are also specimens in the Herbarium cultivated at Kew in 1879.

Folia 4–4½ poll. longa, et 6–7 lin. lata. *Racemi* circiter 1½ poll. longi.

This is very close to *A. Trinii* described in my memoir. It is, however, to be distinguished by having very few, not very numerous flowering branches, at the nodes; by having much longer and broader leaves, compressed not cylindrical spikelets prettily dotted with green; by having the lower palea (flowering glume) of the fertile flowers scabrously hirsute on the upper half, not glabrus as in *A. Trinii*, and by having the two larger squamulæ usually obtuse, not acuminated. The ligule is also more conspicuous. *Munro manuscript in Herb. Kew.*

CCCCLXX.—BOTANICAL ENTERPRISE IN BRITISH CENTRAL AFRICA.

British Central Africa consists of a territory with a total area, north and south of the Zambesi, exceeding 500,000 square miles. The head-quarters of the Government is at Zomba, west of Lake Shirwa. The territory is under the administrative charge of Mr. H. H. Johnston, C.B., Her Majesty's Commissioner and Consul General. The following extracts are taken from a report, lately presented to the Commissioner by Mr. Alexander Whyte, head of the Scientific Department, and published by the Foreign Office (Miscellaneous Series, 1895, No. 373). Mr. Whyte gives an interesting account of the steps taken to establish a Botanic Garden at Zomba, and of the most promising plants grown there for use and ornament:—

I have been requested by Commissioner Johnston to draw up a report on what has already been done at Zomba in the foundation of a Botanical Garden, and what I propose to do in future towards encouraging agricultural enterprise in British Central Africa. I may state that it is also at the request of the authorities of the Royal

Botanical Gardens, Kew, that I have prepared this report, which I would respectfully request may be communicated to them.

On my arrival at Zomba in August 1891, my attention was first directed to choosing a sheltered spot of ground, about an acre in extent, on which to erect nursery sheds for rearing the many varieties of seeds which I had brought out with me. The clearing of the jungle, hoeing of the land, and the erection of thatched sheds was soon accomplished by natives (Yaos) from the neighbouring villages, and I was glad to find that really good honest work could be got from these people with just treatment and proper supervision. When they first mustered with their little circular short-handled home-made hoes I felt disposed to look with despair on the prospect of ever getting effective work done. I soon found, however, that they turned up the soil well, and when proper European implements were placed in their hands they proved to be as good native field labourers as any I had previously met with in other tropical countries.

Of the seeds sown in the nurseries all the European vegetables did well, with one or two exceptions, and a plentiful supply was kept up, which I have no doubt was greatly conducive to the health of the Europeans at the station. Hampers of vegetables were also occasionally sent to other stations of the administration.

The tree seeds also germinated well, and included species of *Cupressus*, *Eucalyptus*, *Acacia*, *Cassia*, *Ficus*, *Grevillea*, *Citrus*, *Thuja*, *Cedrus*, *Carica* (Papaw), &c.

The English potato tubers which I had brought with me were spoilt, I am sorry to say, in transit, owing to the extreme heat, but I am happy to state that the seeds of the potato I had with me turned out remarkably well. By constantly selecting and replanting the small tubers obtained from this seed we at last arrived at several large well-formed mealy varieties, equal in flavour to any English potato. These are now being carefully propagated by Mr. McClounie, the Forester temporarily in charge at the residency. This I look on as a most useful introduction, the potatoes showing no sign of disease, and being, as it were, natives of the country, they are not so liable to degenerate in quality hereafter as the offspring of the English tubers would have been.

During the short stay of Mr. Johnston's expedition at Zanzibar in June 1891, Captain Sclater and I visited Sir John Kirk's old garden, a short way out of town, which is now a station of the Universities' Mission. Through the kind courtesy of the lady missionaries I procured the seeds of a good many economic and ornamental plants from the garden, such as Liberian coffee, *Casuarina*, Cassias, Guavas, Anonas, Passifloras, mango, orange, cucurbitaceous plants, pineapple shoots, &c., and nearly all of them are now doing well at Zomba. I also brought with me a supply of ripe cacao pods from the same garden or plantation, which plant had been introduced years ago by Sir John Kirk. The seeds from these pods, I regret very much to say, failed to germinate.

WHEAT GROWING.

The barley and oats from English seed did well, and yielded fair crops, but the wheat seed from England proved a failure. It germinated well, but grew in tufts like grass, and refused to throw up grain stalks. Later on, however, I received, through Captain Sclater, a bag of wheat seed from the missionaries at Tanganyika. This lot, being acclimatised seed (the original having been imported many years ago by the Arabs), did well, and yielded at the rate of nine bushels per acre, without manure. I was able, from the grain thus secured, to distribute seed to several of the stations best suited for the growth of wheat, and also to a good many of the native chiefs who are raising it, on the understanding that the administration will purchase the produce for the use of its Sikh soldiers. Some of the European planters are also cultivating it, Messrs. Buchanan, at Blantyre, and Mr. Brown, at Mlanje, having had good success. It is to be hoped that this industry will annually increase until sufficient wheat is locally raised for the consumption of the European population. At the present time the missionaries on Tanganyika grow sufficient wheat for their own wants.

TREE PLANTING.

As soon as I found the tree seedlings in the nurseries were sufficiently advanced to be planted out, I commenced forming avenues of them along the main roads of the plantation. On either side of the straight avenue leading from the steps of the terrace garden to the bottom of the grounds I planted out rows of *Cupressus macrocarpa*, *C. lawsoniana*, *C. sempervirens*, and *Widdringtonia Whytei*, alternating with each other. Along the south and east avenue, bananas, *Cupressus macrocarpa*, and *C. sempervirens* were put in alternately. The original main avenue was planted up with *Acacia decurrens*, *Acacia Melanoxylon*, *Eucalyptus* of different varieties, and *Grevillea robusta*. The cross avenue, bisecting the grounds, was lined with *Thuja orientalis* and *T. occidentalis*. I may here mention that all the trees in these avenues have done remarkably well, and at the date of my leaving, last April, they formed quite a pleasing feature in the grounds, and had grown to an average height of 5 feet in two and a half years from seed. This refers to the conifers only, some of the eucalypti having shot up to a height of 45 feet in the same period. . . . . An arboretum of interesting trees was also planted up at the east end of the terrace garden, and this we propose to extend down the sloping ground to the banks of the Mlungusi.

One plot of ground was devoted to the cultivation of handsome native plants, and another to that of economic ones, both indigenous and introduced.

GRASS LAWNS.

The grass lawns form another very effective and pleasing feature in the grounds. These I formed of the roots of a small creeping dub grass,* some patches of which I found on Mr. Buchanan's plantation. It takes possession of the ground in a wonderfully short time, and stands out the dry season well. It forms an excellent and nutritious pasture grass, which is very much required where the common grasses of the country are so strong and rank. I shall do my best to establish this pasture on a large scale all over the grounds of the Residency, and the seeds of it will be regularly saved for distribution.

SEEDS FROM CEYLON AND NATAL.

Through the kind courtesy of Dr. Trimen, of the Ceylon Botanical Gardens, I received some packets of valuable tropical seeds. A good many of these failed to germinate, but some did well, among others the tree tomato.

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* Probably *Cynodon Dactylon*.

Mr. Wood, of the Durban Botanical Gardens, when I called on him on my way home, was kind enough to put us up a large packet of seeds. These, however, I could not send on to British Central Africa, owing to the new coffee-leaf disease regulations, but they have been most useful in enabling me to make exchanges of seeds in England.

NATIVE CEDAR.

The timber of the new Widdringtonia cedar (*Widdringtonia Whytei*) from Mount Mlanje has been proved to be of excellent quality, equal to the finest yellow pine, and easily worked. It has been largely used at the Residency, Zomba, and the greater part of the timber-work of the new roof of that building is composed of it. It is also commanding a ready sale at Blantyre and on the coffee estates. I need scarcely say that I shall do all I can to encourage the planting of it in the Shiré Highlands, as I feel convinced it will play a very important part in the future timber supply of the country. I shall see that seed is regularly collected from the Government forests on Mount Mlanje and nurseries of them kept up. Plants of *Widdringtonia* in the conifer avenues, at Zomba, are now 7 feet high in three years from seed, and show every prospect of doing well at that elevation, 3,000 feet.

PROSPECTS OF BOTANICAL ENTERPRISE.

As regards what I propose doing in the future towards encouraging agricultural enterprise in Nyasaland, I would first of all touch on the choice of a suitable site for botanical and experimental gardens.

I do not think a better could be found than the one now opened up and being experimented with at the Residency, Zomba, which I have already described. My reasons for arriving at this conclusion are :—

1. The soil is good, it is well sheltered, and has a good exposure.
2. The rainfall averages that of other districts on the plateau, and it is artificially well watered by means of an excellent system of irrigation.
3. Both tropical and sub-tropical plants are reared with facility and grow rapidly.
4. It is central, being now within two and a half days of the Lower Shiré and three days of Lake Nyasa.
5. And lastly, but perhaps most important of all, it is a comparatively healthy station for an European Superintendent to live at.

In connexion with it, as an auxiliary garden, the fine sheltered fertile "Palm Stream Valley," eight miles distant from Zomba, on the Blantyre road, might be opened up. A perennial stream flows through this valley, along the banks of which fine specimens of the noble Raphia palm flourish luxuriantly. The land is good, and the little vale is exceptionally well sheltered by the surrounding wooded hills. I consider the lower river district should be studiously avoided, owing to the extreme heat, severe drought, and its unhealthiness as well as the great abundance of locusts and other insect pests.

ECONOMIC PLANTS.

As to the particular economic plants which it is most desirable to introduce, and the produce of which would most probably become staple articles of export in the future, it will be well to state briefly what is now being done in the way of agricultural enterprise.

Coffee is the principal staple at present, and over 30 estates have opened up, and, for the most part, planted with the ordinary *C. arabica.* This will no doubt be the principal cultivation, so long as leaf disease can be kept out of the country. *C. liberica* is also established in the Shiré Highlands; over 100 plants were raised from the seed I brought from Zanzibar, and these are now in full bearing. The Messrs. Buchanan also had several trees of it previous to this. It is more suited for the lower-lying districts than for the hills. Mr. Buchanan is besides cultivating several other varieties of *C. arabica*, and has also introduced a small-berried native one called "Quilimane coffee." Shiré Highlands coffee sold in Mincing Lane the other day at from 4*l.* 16*s.* to 5*l.*,* and it has now become a speciality in the London market, where it is in great demand. The natives, in some instances, have been induced to cultivate coffee on their own account, and I have no doubt they will do so more and more as they become more and more intelligent and enterprising.

Tobacco has been extensively cultivated by the Messrs. Buchanan for some years, both at Blantyre and Zomba. They have now a large local sale for their cut tobaccos and cigars, which are excellent. They have also obtained remunerative prices for their leaf in the London market, much of which is available for "wrappers." Mr. Robert Buchanan, of this most enterprising firm, which has already done so much to develop the resources of Nyasaland, is now at home, and is busily engaged in the study of tobacco manufacture, and selecting coffee, sugar, and other machinery. The experience thus gained I feel sure will be of benefit, not only to the Messrs. Buchanan, but also to the country at large. There is unlimited scope for the cultivation of this promising product. In Ceylon and many other British possessions this industry has made no headway, owing to the expense of labour and the scarcity of suitable land. Here the one is perhaps the cheapest in the world, and the other almost boundless. The natives have grown tobacco for their own use for many years.

Cane sugar has been manufactured for years by Mr. Buchanan at Zomba for local consumption. The climate and soil of the Upper Shiré are, however, more suited for the cultivation of sugar. The Messrs. Buchanan have therefore decided to extend their operations on the river, near Fort Liwonde, where they have procured a suitable grant of land for the purpose. Sugar being so low in price, and likely to continue so, I fear an export trade in it could not be made to pay in British Central Africa, even were the railway completed. The sugar-cane being a thoroughly tropical plant matures sooner on the hot steamy banks on the Shiré than it does in the Shiré Highlands.

Tea of good varieties, Assam and China, has been introduced, but is not as yet cultivated to any extent. It grows luxuriantly, and ought to do well in some districts. Our long dry season would prevent its flushing so freely as it does in Ceylon or Assam, but against this we have to put the abnormally low price of labour at from 9*d.* to 1*s.* per lb.

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* Some samples commanded a price as high as 5*l.* 5*s.*—H. H. J.

I see no reason why it should not become a profitable cultivation. I shall do all I can to introduce seeds and plants of the very best teas procurable.

Theobroma Cacao.—I have great faith in this valuable product doing well in the Shiré Highlands, and in most of the plateau of Nyasaland . . . . more especially along the banks of our rivers and in many of the sheltered valleys on the slopes of our mountain ranges. Suitable shade trees should be planted with it, such as *Erythrina*, pimento, and nutmegs.

India-rubber or *caoutchouc* is another most important article of commerce the production of which should be encouraged. For this we are most favourably situated both as to climate and soil, as also the variety of caoutchouc-yielding trees and creepers which are indigenous to the country. It is an industry which specially recommends itself to the natives, who are naturally fond of woodcraft, and do not place much value on time when working for themselves.

CCCCLXXI.—NEW ORCHIDS.—DECADE 14.

131. **Pleurothallis rotundifolia**, *Rolfe;* nana, foliis brevissime petiolatis orbiculari-obovatis minutissime tridenticulatis marginatis carnosis, scapis gracillimis circa 6–floris, bracteis basi tubulosis apice triangulari-ovatis acutis parvis, sepalo postico oblongo acuto concavo, lateralibus fere omnino connatis oblongis brevissime bidentatis, petalis spathulato-oblongis subobtusis, labello subrecurvo integro oblongo obtuso, columna clavata marginibus alatis apice acuta.

HAB.—Jamaica, *Morris.*

Folia 3-4 lin. longa, 2½–3½ lin. lata; petiolus 1–2 lin. longus. *Scapi* 1¾ poll. longi. *Bracteæ* ½ lin. longæ. *Pedicelli* 2 lin. longi. *Sepalum* posticum 2 lin. longum, lateralia 2¼ lin. longa. *Petala* ¾ lin. longa. *Labellum* ¾ lin. longum. *Columna* ½ lin. longa.

An interesting little species sent to Kew in 1880 by the Assistant Director, Dr. Morris, at that time Director of the Public Gardens and Plantations, Jamaica. It belongs to the group *Apodæ Cæspitosæ*, and is allied to *P. unistriata*, Rolfe, differing in having leaves only half as long and nearly orbicular. The flowers are straw-coloured, with three light red-purple nerves on the dorsal sepal, and the mid-nerve of the petals and basal three-fourths of the lip also purple-red in colour. Among Jamaica species it comes nearest to *P. delicatula*, Lindl.

132 **Cœlogyne carinata**, *Rolfe;* pseudobulbis tetragono-ovoideis diphyllis, foliis subsessilibus elliptico-oblongis v. lanceolatis subacutis, scapis arcuatis, racemis flexuosis circa 6–8–floris, bracteis lineari-lanceolatis acutis deciduis, ovariis hexapteris, sepalis oblongis acutis acute carinatis concavis, petalis linearibus acutis, labello trilobo lobis lateralibus erectis angustis subobtusis intermedio ovato-oblongo obtuso subundulato, disco tricarinato carinis lateralibus crenulatis, columna clavata apice alata.

HAB.—New Guinea.

Pseudobulbi 1½–1¾ poll. longi, ¾–1 poll. lati. *Folia* 4–5 poll. longa, 1¼–1½ poll. lata. *Scapi* 4–8 poll. longi. *Bracteæ* 7–9 lin. longæ. *Pedicelli* 8–9 lin. longi. *Sepala* 11 lin. longa, 4 lin. lata. *Petala* 10 lin. longa. *Labellum* 9 lin longum. *Columna* 7 lin. longa.

Introduced by Messrs. F. Sander & Co., with whom it flowered in June of the present year. Allied to the New Hebridean *Cœlogyne lamellata*, Rolfe (*Kew Bulletin*, 1895, p. 36), but it has differently coloured flowers of about half the size. The sepals and petals are very light, almost whitish green, and the lip paler, with an orange-brown area on the basal half of the front lobe and apex of the side ones. The basal part of the lip is also lightly splashed with orange brown, and the column light green. Scapes produced from the young growths before the leaves are fully developed.

133. **Eulophia deflexa**, *Rolfe;* foliis lanceolato-linearibus acutis, scapis elongatis simplicibus, bracteis ovato-lanceolatis acutis, sepalis patentibus lanceolato-oblongis acutis carinatis, petalis subdeflexis ovatis apiculatis v. subobtusis, labello trilobo lobis lateralibus oblongis obtusis intermedio orbiculari-ovato obtuso, disco trilamellato barbato, calcare oblongo, columna clavata.

HAB.—Natal, *Allison.*

Folia 6–16 poll. longa, 5–7 lin. lata. *Scapi* 2 ped. alti. *Bracteæ* 6–9 lin. longæ. *Pedicelli* 10–12 lin. longi. *Sepala* 10 lin. longa, 3–3½ lin. lata. *Petala* 10 lin. longa, 6 lin. lata. *Labellum* 9 lin. longum, 5 lin. latum. *Calcar* 2 lin. longum. *Columna* 3 lin. longa.

An ally of *E. barbata*, Spreng., from which it differs in its more robust habit and lax raceme of larger and differently coloured flowers. It was sent to Kew by Captain Allison in 1891, and flowered in June of the present year. The sepals are a peculiar shade of light purple-brown, and the petals and lip beautifully veined with lilac-purple on a much lighter ground. The lamellæ and fringes of the lip are yellowish-white. The petals incline forward over the lip; hence the name.

134. **Polystachya zambesiaca**, *Rolfe;* pseudobulbis ellipticis v. elliptico-oblongis subcompressis di-triphyllis, foliis oblongis v. lanceolato-oblongis subobtusis basi conduplicatis subtus glaucescentibus carinatis, scapis terminalibus pubescentibus 4–8-floris, bracteis latissime rhomboideo-ovatis acuminatis pubescentibus submembranaceis, sepalis triangulari-ovatis acutis lateralibus carinatis, petalis lineari-oblongis bidenticulatis postice canaliculatis incurvis, labello recurvo trilobo lobis lateralibus erectis rotundatis intermedio ovato obtuso canaliculato, callo late oblongo pubescente, columna brevissima.

HAB.—Tropical Africa: Upper Zambesi, *Buchanan.*

Pseudobulbi 5–9 lin. longi, 4 lin. lati. *Folia* 1¼–3¼ poll. longa, 3–7 lin. lata. *Scapi* 2–3 poll. longi. *Bracteæ* 2–3 lin. longæ. *Pedicelli* 4 lin. longi. *Sepala* 4–5 lin. longa. *Petala* 3 lin. longa. *Labellum* 3 lin. longum. *Columna* 1 lin. longa. *Mentum* 2 lin. longum.

A small plant with the general habit of *Polystachya lawrenceana*, Kränzl., from the same region, which is perhaps its nearest ally. It flowered with Mr. James O'Brien in May 1894, and at Kew a year later. The flowers are greenish-yellow, with a deep brown spot on the foot of the column, and some light purple veining on the side lobes of the lip. The bracts are whitish.

135. **Batemania peruviana.** *Rolfe;* pseudobulbis oblongis tetragonis diphyllis, foliis late lanceolatis acutis submembranaceis subtus subglaucis racemis paucifloris, bracteis conduplicatis latissime ovatis obtusissimis, sepalo postico erecto elliptico-oblongo obtuso apiculato, lateralibus subpatentibus oblongis subobtusis basi subconduplicatis, petalis erectis elliptico-ovatis obtusis subapiculatis apice subreflexis, labello trilobo, lobis lateralibus erectis rotundato-oblongis denticulatis, intermedio obovato-oblongo apiculato apice recurvo, callo carnoso transverso apice denticulato infra medium labelli sito, columna clavata apice alata denticulata, mento obtuso.

Hab.—Peru.

Pseudobulbi 2¼ poll. longi, 1 poll. lati. *Folia* 8 poll. longa, 1¾ poll. lata. *Bracteæ* 6 lin. longæ. *Pedicelli* 10 lin. longi. *Sepalum* posticum 10 lin. longum, 6 lin. latum; lateralia 11 lin. longa, 4 lin. lata. *Petala* 10 lin. longa, 7 lin. lata. *Labellum* 9 lin. longum. *Columna* 9 lin. longa. *Mentum* 3 lin. longum.

Introduced by Messrs. F. Sander & Co, and flowered in their establishment in March last. The sepals and petals are brown with green tips and a few irregular narrow green lines below; the column and lip white with innumerable minute purple dots at the base, and an irregular purple stain at the base of the front lobe. It is the fourth known species of the genus, the others being *B. Colleyi*, Lindl., *B. armillata*, Rchb. f., and *B. Beaumontii*, Rchb. f. The two latter are wrongly referred to *Zygopetalum* in the *Genera Plantarum*, but agree in structure with the original *B. Colleyi* and with the present species.

136. **Maxillaria parva,** *Rolfe;* nana, pseudobulbis cæspitosis elliptico-oblongis subcompressis monophyllis, foliis sessilibus lineari-oblongis acutis carinatis, scapis brevissimis vaginis laxis imbricatis, bracteis ovatis acutis carinatis, sepalis suberectis oblongis apiculatis apice subrecurvis, petalis erectis oblongis acutis apice recurvis, labello late oblongo subtrilobo lobis lateralibus erectis puberulis intermedio latissime oblongo obtuso apice revoluto, callo carnoso obtusissimo nitido, columna clavata.

Hab.—Brazil.

Pseudobulbi 4–6 lin. longi, 3–4 lin. lati. *Folia* 1–1¼ poll. longa, 2½–4 lin. lata. *Scapi* 4 lin. longi. *Bracteæ* 4 lin. longæ. *Sepala* 5 lin. longa, 2½ lin. lata. *Petala* 4 lin. longa, 2 lin. lata. *Labellum* 4 lin. longum, 2½ lin. latum. *Columna* 3 lin. longa.

A dwarf species allied to *Maxillaria pumila*, Hook., which flowered in the collection of C. Ingram, Esq., Elstead House, Godalming, in May 1890, having been discovered in a clump of *Sophronitis grandiflora*, Lindl. It was presented to Kew, and has since flowered annually. It is allied to *M. pumila*, Hook. (*Bot. Mag.*, t. 3613), but has stouter pseudobulbs, longer leaves, and yellow instead of purple flowers, with a light reddish-brown anther-case.

137. **Luisia Cantharis**, *Rolfe;* caule elongato, foliis teretibus elongatis subobtusis rigidis basi tubuloso-vaginatis, racemis brevissimis paucifloris bracteis transverse oblongis truncatis, sepalo postico lineari-oblongo obtuso concavo lateralibus oblongis acutis subconduplicatis

acute carinatis carnosis, petalis linearibus oblongis planis, labello trilobo lobis lateralibus erectis rotundatis parvis intermedio elliptico brevissime bidentato, disco 5 carinato, columna brevissima.

HAB.—Shan States, Burma.

Folia 4–6 poll. longa, 2 lin. lata. *Bracteæ* 1 lin. longæ. *Pedicelli* 6 lin. longi. *Sepalum* posticum 8 lin. longum; lateralia 7 lin. longa. *Petala* 9 lin. longa. *Labellum* 6 lin. longum, 2½ lin. latum. *Columna* 1½ lin. longa.

A remarkable species, allied to *L. volucris*, Lindl. It was imported by Messrs. Hugh Low & Co., who flowered it in June of the present year. The lip is clasped on either side by the almost conduplicate lateral sepals, and resembles a beetle of the genus *Cantharis*, with corrugated dull purple elytra. The dorsal sepal is a little tinged with light purple near the margin, the rest, together with the petals, being whitish; the lateral sepals are light green, with a broad dull purple margin, and the lip is of the latter colour, with some white at the extreme base, and a yellowish-white sunken area at the apex. The tip of the lip is appressed to the stem, as in *L. volucris*, and the petals are deflexed on either side, as if to direct an insect to the pollinia.

138. **Angræcum stylosum,** *Rolfe;* subacaulis, foliis oblongis v. obovato oblongis brevissime bilobis obtusis, racemis pendulis multifloris, bracteis spathaceis late orbiculari-ovatis obtusis sepalis petalisque lanceolato-oblongis breviter acuminatis v. apiculatis reflexis, labello lanceolato-oblongo apiculato reflexo apice concavo, calcare elongato arcuato, columna clavata subelongata crassiuscula.

HAB.—Madagascar.

Folia 3½–5½ poll. longa, 1¼–2½ poll. lata. *Racemi* 1¼–2 ped. longi. *Bracteæ* 3–4 lin. longæ. *Pedicelli* ¾–1 poll. longi. *Sepala* 10–11 lin. longa. *Petala* 8–9 lin. longa. *Labellum* 8–9 lin. longum. *Calcar* 4–5 poll. longum. *Columna* 3 lin. longa.

A striking species introduced by Messrs. F. Sander & Co., with whom it first flowered in July 1893. It has the general habit of the African *A. apiculatum*, Hook., with flowers nearly twice as large, while its unusually large column is characteristic. The flowers are smaller than in *A. Ellisii*, Rchb. f., the segments narrower and more reflexed, and the colour white with the spur tinted with light brownish buff.

139. **Notylia brevis,** *Rolfe;* pseudobulbis subobsoletis, foliis oblongis obtusis basi conduplicatis, racemis brevibus multifloris, bracteis lineari-lanceolatis acutis, sepalis liberis lanceolato-oblongis subacutis concavis, petalis lanceolato-oblongis subacutis concavis, labello breviter unguiculato trulliformi-ovato acuto basi calloso-carinato, columna subclavata lævi.

HAB.—Andes of S. America.

Folia 4–4½ poll. longa, 16 lin. lata. *Racemi* 1½ poll. longi. *Bracteæ* 1–1¼ lin longæ. *Pedicelli* 1 lin. longi. *Sepala* et *petala* 1¼ lin. longa. *Labellum* 1¼ lin. longum, ¾ lin. latum. *Columna* 1 lin. longa.

Introduced by Mr. F. C. Lehmann, and flowered in the collection of Sir Trevor Lawrence, Bart., in March last. It is allied to *N. micrantha*, Lindl., though it markedly differs from this and every other small flowered species in its very short racemes. The sepals are nearly white, the petals stained with yellow on the disc, and the lip white. The precise locality is not known.

140. **Pelexia saccata**, *Rolfe*; foliis petiolatis elliptico-ovatis subacutis variegatis, scapis erectis pubescentibus, racemis elongatis multifloris, bracteis lanceolatis acuminatis, ovario pubescente, sepalo postico lanceolato-oblongo subobtuso concavo, lateralibus lanceolato-linearibus acutis, petalis oblanceolatis subobtusis cum sepalo postico in galeam conniventibus, labello columnæ marginibus adnato ovato apice subobtuso reflexo basi in calcare saccato obtuso ovario fere omnino adnato extenso, columna clavata.

HAB.—Guatemala.

Folia 5–6 poll. longa, 2–$2\frac{1}{4}$ poll. lata; petiolus 3–4 poll. longus. *Scapi* $\frac{3}{4}$–$1\frac{1}{4}$ poll. longi; racemi 5–7 poll. longi. *Bracteæ* 8–12 lin. longæ. *Ovarium* 5–6 lin. longum. *Sepala* et *petala* 5 lin. longa. *Labellum* 4 lin. longum. *Calcar* 3 lin. longum. *Columna* 3 lin. longa.

Imported by Messrs. F. Sander & Co., and flowered in their establishment in May last. Near *P. maculata*, Rolfe (*Kew Bulletin*, 1893, p. 7), but is readily distinguished by its shorter flowers and shorter more sac-shaped spur. The leaves are light green marbled with small irregular olive-green blotches, and a darker irregular band along the midrib, which is light reddish purple underneath. The sepals are green, and the petals and lip whitish.

CCCCLXXII.—SIAM BENZOIN (continued).

A brief account was recently given in the *Kew Bulletin* (1895, pp. 154–155) of the source of Siam Benzoin. This was obtained from a report furnished to the Foreign Office by Mr. Walter R. D. Beckett, Vice-Consul at Bangkok.

As the result of independent inquiry made at the instance of Kew by the India Office, the following further information has been received. This was obtained through the Siamese Minister of the Interior at Bangkok. It affords, therefore, an account of Siam Benzoin from the purely native point of view. All the accounts agree in ascribing the region of the Benzoin trees to the left bank of the Mekong river, in what is now French territory. This is a tract of upland country east and north-east of the important town of Luang Prabang :—

INDIA OFFICE to ROYAL GARDENS, KEW.

India Office, Whitehall, London, S.W.
30th July 1895.

SIR,

IN continuation of previous correspondence, I am directed by the Secretary of State for India to forward herewith for your information a copy of a letter, and its enclosure, regarding the tree producing

Siam Benzoin. It is suggested that the memorandum on the Siam Benzoin may be found suitable for publication in the *Kew Bulletin.*

I am, &c.
(Signed) A. N. Wollaston.
Assistant Secretary,
Revenue and Statistics Department.

The Director,
Royal Gardens, Kew.

No. 606.—2 F.—7, dated Rangoon, the 30th May 1895.
From—The Revenue Secretary to the Chief Commissioner of Burma.
To—The Secretary to the Government of India, Revenue and Agricultural Department.

With reference to the correspondence concerning the steps taken with the view of identifying the plant or tree which produces the resin known as "Siam Benzoin," I am directed to submit, for the information of the Government of India, a copy of a memorandum regarding the tree that produces this resin, and on the Gum Benjamin industry in Siam, prepared in Bangkok under the orders of the Siamese Minister of the Interior, and forwarded to the Chief Commissioner by Mr. J. G. Scott in April 1894. . . . .

Mr. Scott stated that the area in which the Gum Benjamin trees were found was said to be all on the left bank of the Mekong, and, therefore, in what is now French territory. . . . .

Mr. Scott further remarked "the great Siam Benzoin tract is Hna Pan Htang, Ha Htang Hôk, the upland country east and north-east of Luang Prabang." . . . . . .

Memorandum regarding the Tree that produces Resin, and on the Gum Benjamin Industry in Siam.

The Gum Benjamin tree is large and tall, and has a heart similar to that of the "teng rang" (a species of *Shorea*) and "phayom" (a kind of mahogany). In its general character and in the form of its leaves it resembles the "takieu" tree (a forest tree of hard wood used for making dug-out boats). The Gum Benjamin tree is propagated from the original fruit. This, when fallen and lying upon the ground, takes root and sprouts after the fashion of the "phayom" and "gang" trees. As regards the trunk of the Gum Benjamin tree, there is no one who uses it. Gum Benjamin trees are generally found on elevated ground, and do not like the plains country. They grow in isolated patches like the forests of "teng-rang" and teak. A forest patch of Gum Benjamin usually contains from 50 to 60 trees and upwards, and the tree is found generally in large numbers along the high hills in the extensive forest region of Slua Phan, Tangslok, and the borders of Müang Theng, in the province of Luang Prabang. It is rarely met with in other countries except those outside the provinces immediately contiguous to Siam. The Siamese Thai, Annamites, and Tongsoos, who have settled in the above-mentioned provinces, have worked out and traded in the Gum Benjamin from an early period for successive generations, and these are scattered amongst the neighbouring people as well as being frequently found in Siam also. The season for working the Gum Benjamin is from the eighth or ninth months (July and August) to the tenth and twelfth months (September and November), when the season ends.

Thenceforward is the period during which the Gum Benjamin is bought and sold. The Gum Benjamin is worked after the following methods. So many trees are notched so as to form a girdle round the stem. An interval of three months is allowed to elapse between the period of notching and that of picking the Gum Benjamin dammar, which wells out of the trunk and collects in the notches. By means of a sharpened stick or the point of a knife this is picked out, bark and all, and gathered at once in baskets. It is then sorted and divided into different classes, according to choice. Picking cannot commence before the interval of three months has elapsed, as the dammar that has trickled out into the notches would not have had time to harden. It would still be soft and sticky, and if picked at the time would become dirty, owing to the bark coming off with it; nor would it be of such value either, as, being sticky, it would cling to other things, and the full benefit would not be derived, such as would be the case if it were properly dry. For this reason, the Gum Benjamin must be left for three months after the notching, in order that all the gum possible may well out, and it may become dry and hard. Among the people above mentioned the picking and sale of Gum Benjamin is generally considered as one way of obtaining a livelihood, for the gum has a value, and is reckoned as a marketable commodity. And even if the people have no other occupation but selling Gum Benjamin, that by itself is sufficient as a means of livelihood. The period during which the Gum Benjamin is sold is not necessarily confined to the eighth or ninth months. The reason for selecting that season is because the people of those parts have many other things to do; for instance, they have to plough the fields and reap their rice harvest. In the eighth and ninth months their work on the paddy fields is finished, and they can therefore turn their attention to Gum Benjamin. For this reason there is a special season. Their paddy fields are their first care, and then the Gum Benjamin trade. Those who have no business with ploughing paddy fields and planting rice can, if they wish, work continuously at Gum Benjamin at all seasons, and during every month of the year. The Gum Benjamin trade requires no very great outlay of capital. All the implements required are one large axe, a rice basket, and an open woven basket. If a person wishes to work alone without servants to assist him, he can do so; for in the first stages there is nothing much that requires to be lifted or carried. The only labour necessary would be when the Gum Benjamin is being picked and placed in baskets, and has to be carried to the temporary or permanent home of picker. The profits gained on any one particular occasion or another can hardly be gauged accurately. Those who work out much sell at a large profit, those who work out little sell at smaller profit. One catty (133⅓ lbs.) and upwards would be considered a large output. Picked Gum Benjamin is sorted into three classes. The best class, and that which fetches a high price, is called "slua," and is that which is sold in large lumps, and is not dirtied by the presence of bark. The second class is that left over from the first class, and is in somewhat smaller lumps than the latter, and has some, but not much, bark attached to it. This is inferior in quality to Class I., and is half the value. That is to say, if Class I. is sold at 75 ticals, Class II. would sell at 37½ ticals. The third class is that left over from Class II. This class has bark attached to it, is soiled with dust and dirt, and is in fine small pieces. It is called "mun," and is half the value of Class II. The price of Gum Benjamin as sold in the jungle districts where the gum is worked is as follows:—Class I.

One Chinese catty (66⅔ lbs.), 100 or about 75 ticals. Class II. Half the price of Class I. Class III. Half the price of Class II. The price in Bangkok is:—Class I. One Chinese catty, 260 ticals, as it has always been.

The Gum Benjamin trees that grow in the jungle districts referred to are not the subject of disputed ownership by one person more than another. Any one who wishes to work Gum Benjamin has merely to go into the jungle, search for and notch as many trees as he pleases, like people, for example, who go into the jungle to cut posts for their houses. Nor is there any tax or other emolument accruing to the country from either the trunk or the gum of the Gum Benjamin tree; nor is the Gum Benjamin trade one in the prosecution of which much thieving or fighting arises, whether it is because there are many people together at a time, or because, being in the jungle where there are fierce tigers, one man cannot steal along alone by himself, but is obliged to travel with parties, and so robbery and theft are rendered impossible, is uncertain. This gum is sweet-scented, and is much used in mixing either with medicines or scents of various kinds. For whichever of these purposes it is sold, it always fetches a high price like other valuable commodities, and for that reason Gum Benjamin is an article of commerce which merchants have bought and sold from time immemorial to the present day.

CCCCLXXIII.—MISCELLANEOUS NOTES.

In the *Kew Bulletin* for February last (p. 38), an account is given of a small collection of dried plants made by Mr. F. H. SMILES, a gentleman attached to the Royal Survey Department of Siam. Amongst them was a remarkable scitamineous plant, upon which a further note will be found below. Mr. Smiles returned to Siam in December last with the intention of making further botanical collections. We regret to learn from a letter communicated to us by a friend that "while up-country, near Korat Siam, he died of dysentery in May last." It was confidently anticipated that he would have added considerably to our knowledge of the rich flora of Upper Siam. For nearly a quarter of a century we have endeavoured to procure from thence seeds or plants of the celebrated tree yielding Siam Benzoin, but so far without success.

Botanical Magazine.—All the figures in the July number were drawn from plants that flowered at Kew. *Senecio Hualtata* is a gigantic herbaceous plant, native of Chili and the Argentine Republic. It was raised from seeds presented by Mrs. Ayscoghe Floyer of Basingstoke, and collected by her daughter, Mrs. Glynne Williams, at Vipos, about 19 miles north of the city of Tucuman. *Pyrus cratægifolia* is an elegant shrub or small tree, a native of Northern Italy, and so much like a thorn in appearance that one would naturally take it for a *Cratægus*. *Aristolochia ungulifolia* is singular in a genus remarkable for the variety in shape and size of the perianth. It is a native of Borneo, and was sent to Kew by Mr. H. N. Ridley, Director of Gardens and Forests in the Straits Settlements. *Neuwiedia Griffithii*, from Malacca, is exceedingly interesting botanically as representing a small tribe of the Orchideæ, having free stamens. This was also collected and sent to Kew by Mr. H. N. Ridley. The last figure is of

Rubus lasiostylus, a very pretty Chinese species, and one of Dr. A. Henry's numerous discoveries and introductions.

Hooker's Icones Plantarum.—The fourth and concluding part of the fourth volume of the fourth series—plates 2376 to 2400, has been published. *Mascarenhasia utilis* (Apocynaceæ), a native of Madagascar, is from the collection of the Rev. R. Baron, who states that it is one of the important plants from which india-rubber is obtained. *Mussændopsis beccariana*, is a Malayan tree allied to the American *Calycophyllum*. This is the second genus of this affinity recently figured in this work. The other is *Emmenopterys* (plate 1823), a native of China. Several interesting grasses are figured, among them *Cyathopus*, a new genus from Sikkim. *Didissandra longipes*, *Rhododendron Hancockii*, *Brandisia racemosa*, *Jasminum primulinum* and *Codonopsis convolvulacea* are Chinese plants, all of an ornamental character. They were collected in Eastern Yunnan by Mr. W. Hancock, F.L.S. From the Rev. R. B. Comins's last Solomon Islands' collection there are the curious *Tabernæmontana anguinea*, *Stemonurus megacarpus*, and *Oxymitra macrantha*, which were described in the *Bulletin* for June-July. *Argostemma concinnum* is a miniature one-flowered plant belonging to the Rubiaceæ, collected in Northern Siam by Mr. Smiles of the Royal Survey Department.

Hand-List of Ferns and Fern Allies.—This hand-list was issued in April last. The following account is given in the Preface of the fern collections at Kew:—

The collections of ferns, whether tropical or temperate, is perhaps, next to that of palms, the most important feature of the cultivation under glass in the Royal Gardens.

A special interest attaches to it, because it has been used so much in the preparation of most of the books and papers dealing with ferns which have been published in this country during the last half century. The celebrated botanical artist, Francis Bauer, was resident draughtsman for 50 years (1790–1840) to the Royal Botanic Gardens at Kew, and the beautiful series of analytical drawings of ferns which he made were published by Sir William Hooker, after his death in 1842, with descriptive letter-press and additions, under the title of *Genera Filicum*. During the 25 years (1840–1865) for which Sir William Hooker was the director of the gardens his attention was specially concentrated on ferns. Under the title of *Species Filicum* he published an elaborate work in five volumes, in which all the known species of typical ferns are fully described, and their synonomy and geographical distribution worked out, with copious illustrations by Mr. Walter Fitch. Of this, the first volume appeared in 1846, and the last in 1864. He planned also a condensed hand-book of all the known ferns, to be called *Synopsis Filicum*, intended specially for the use of colonists and travellers. All the drawings for this had been made, but the letter-press was not far advanced when he died in the autumn of 1865. It was completed by Mr. J. G. Baker, F.R.S., now Keeper of the Herbarium, in 1868, and a second edition was brought out in 1874. Since that date many hundred new species have been discovered, and a volume of Hooker's *Icones Plantarum*, containing plates and descriptions of the more interesting of the novelties, was published in 1887. Mr. Baker has also published in the *Annals of Botany* (1891) a summary of new ferns discovered or described since 1874. The type specimens from which most of the descriptions and plates contained in this series of books have been made are deposited in the Kew Herbarium.

The living collection in the garden owes its completeness very largely to the zeal and assiduity with which the veteran pteridologist, Mr. John Smith, curator of the Royal Gardens from 1841–63, watched over it for more than 40 years.

In his privately printed *Records of Kew* (pp. 322, 323) he gives the following particulars of its origin and development:—"In the year 1822 I found the collection of ferns at Kew extremely poor, especially as regards tropical species, very many of those introduced in previous years having been lost and very few new ones added. . . . The tender exotic species were more or less of them growing without any arrangement in different houses, and unnamed, their number amounting to about 40. In 1825 I arranged the tropical species in a group at the end of the then lean-to house . . . now included in the tropical fern house, the area they occupied being 6 ft. by 12 ft. These formed the nucleus of the now great collection. They were successively added to by importations of living plants, as also plants raised from spores obtained from herbarium specimens."

"The collection continued yearly to increase, and in 1846 [1845] I drew up a list of the collection, which was published in an appendix to the *Botanical Magazine*, for that year; the number then amounted to 400 [378] species. This in 1857 [1856] was followed by another list, entitled 'Catalogue of Cultivated Ferns,' in which 600 [504] species are enumerated."

The principal books published by Mr. Smith are his *Ferns, British, and Foreign*, issued in 1866, which contains a classified list of all the species then known in cultivation, full directions for the cultivation of ferns of the different climatic types and by far the most complete history of their gradual introduction which has ever appeared in print, and his *Historia Filicum*, issued in 1875, which contains woodcuts of 220 types and gives a full exposition of his views on fern classification.

In 1868 the last published list was prepared by Mr. J. G. Baker. It enumerates 802 species and varieties of ferns and 48 of fern allies.

The present list comprises 1116 species and varieties of ferns and 97 of fern allies; this is exclusive of British ferns, of which 586 varieties are in cultivation.

The collection falls into three great groups:—(i.) Tropical; (ii.) Temperate; and (iii.) Hardy Ferns.

The Tropical Ferns are cultivated in No. II. House.

The Temperate Ferns are cultivated in No. III.; the Filmy Ferns have a separate House (No. II. A.), constructed for the special treatment which they require. The fine collection of Temperate Tree Ferns is contained in the Temperate House.

The Hardy Ferns are arranged on and about a small rockery, $\frac{7}{E}$ of the Key Plan, and forming the south boundary of Lawn L.

The structural development of the buildings in which the collection is housed has kept pace with its growth. Their history may be given briefly.

The Tropical Fern House (No. II.) is a span-roofed house 129 feet long, 34 feet broad, and 15 feet high in the centre. It has a wide transept on the south side, 40 feet long, 33 feet wide, and 19 feet high.

In 1841 the site of this house was occupied by two lean-to houses used for miscellaneous collections of stove plants. They are enumerated in Dr. Lindley's Report to the Treasury (1838) as Nos. 2 and 3; the former stood to the west, and was 50 feet long; the length of the other was 60 feet. It was in No. 2 that, as stated above, John Smith first arranged the nucleus of the collection of Tropical Ferns.

In 1843, No. 2 was doubled and made into a span house.

In 1845, No. 3 was entirely taken down, and a new span-roofed house erected in its place. It joined on to No. 2, which was kept at a somewhat lower temperature, but opened into it through a partition. The centre was filled up with slate shelf staging, and the sides with stone shelves. No. 2 was used as a stove for rare palms and large tropical ferns. No. 3 was at first occupied by the Woburn collection of orchids presented by Her Majesty the Queen; for this purpose it proved eventually unsuited. The orchids were gradually replaced by *Aroideæ* and ferns. Ultimately the latter obtained possession of the whole house. According to John Smith (Records, p. 334), "the centre of the house was a raised sloping rockery, amongst which the plants were growing in a natural state, forming fine bushy specimens."

A small house for tree ferns was built in 1861; this was connected with the principal house in 1868, and now forms the transept.

In 1879 the Tropical Fern House, which from the decay of the timbers had lapsed into an almost ruinous condition, was further severely damaged by the hail storm of August 3rd; 1,152 panes of glass in it were broken. It was subsequently put into a thorough state of repair, but the collections received considerable damage.

In 1887 the west end of the house was set back a few feet; the staging was partly re-arranged and the broad path through the transept was made.

The humid conditions necessary for the cultivation of tropical ferns are unfortunately not conducive to the preservation of the structures in which they are grown when they are built of wood. In 1889 it therefore again became necessary to renew the east wing of No. II. House. In order to secure greater durability it was decided to use iron for the principal framework, and wood only for the lights. The top ventilation was provided for by means of a lantern instead of by the older and more clumsy method of sliding sashes. At the same time the use of green glass in the reconstructed wing was abandoned. This was introduced at Kew in 1846 on the recommendation of the late Mr. Robert Hunt, F.R.S., who advocated its use on theoretical grounds which are now known to be mistaken. The resulting improvement in the growth of the plants, especially the species of *Adiantum* was very marked, and in 1892 a portion of the west wing was re-glazed with equally satisfactory results.

The temperate ferns are now collected in a house (No. III.), which was also built on the system of mixed iron and wood construction. It was erected in 1892 to take the place of a decayed and obsolete structure composed of two small greenhouses united together, Nos. 4 and 5 of Dr. Lindley's report. The former (the northern wing) was erected in 1803, and in 1840 contained New Holland and Cape plants; the latter, which was "remodelled" in 1825, was filled with succulents.

The reconstructed No. III. is a span-roofed house 60 feet long, 23 feet wide, and 13 feet high. It contains a broad central and two side stages, with paths on both sides.

The north wing of the former No. III. had been latterly devoted almost exclusively to filmy ferns after the Kew collection had been enriched by the gift of that formed by the late John Cooper Forster, which was presented to the Royal Gardens in 1888 by his widow.

The collection is now contained in the new Filmy Fern House (No. II. A.) erected on the north side of No. II. It is 50 feet long by 14 feet wide, with a central path and two cases running the full length of the house.

The hardy ferns occupy the rockery originally devoted to Alpine plants (before the construction of the Rock Garden in 1882), and it extends over part of the adjacent ground. A collection was established here in 1874, and the rockery itself was reconstructed in 1888.

The collection as a whole is now probably the richest in existence in garden forms of British species. This is due to the munificent bequest by W. C. Carbonell, Esq., of the extensive collection formed by him at Rhiw Castell, Usk, Monmouthshire. The whole was removed to Kew in 1887. It consisted of 4,261 specimens, many probably unique, besides some hundreds of seedlings.

The total number of well-marked species of ferns and the vascular Cryptogamia (fern allies) now mounts up to 3,500. Not more than one-third of these have been brought into cultivation, and Kew is always glad to receive any additions, if possible in the form of well-established plants; if not, in the shape of dry spores, which can be collected and sent very easily by post in small packets.

The following table, which shows the per-centage of the total number of ferns found in different parts of the world was drawn up by Mr. Baker in 1867; but he does not think that the discoveries of the last 20 years will have altered any of the figures materially:—

Arctic Zone - - - -	1	per cent.
Europe - - - -	4	„
Temperate Asia, including Himalayas -	18	„
Temperate N. America - - -	5	„
Temperate S. Africa - - -	7	„
Australia and New Zealand - -	9	„
South temperate America - -	5	„
Tropical Africa - - -	15	„
Tropical Asia - - -	39	„
Tropical America - - - -	42	„

The present hand list is divided into three parts:—

(i.) Ferns proper (pp. 13–133);
(ii.) Fern allies (pp. 135–143); and
(iii.) as an appendix, a list of garden forms of British species (pp. 145–183).

With regard to (i) ferns proper, the arrangement is alphabetical and synonyms have been only sparingly introduced, those included being chiefly such as are in use in gardens and which are here referred to the correct name in each case. It has not been thought necessary, therefore, to supply an index. Those who wish to pursue the study of fern-nomenclature further may fall back on Hooker and Baker's *Synopsis Filicum*, upon which the present hand list is substantially based.

The fern allies (ii) have also been grouped alphabetically. It has not been thought necessary for the present purpose to separate them according to a botanical classification.

The cultivated and feral varieties of British ferns (iii) have been enumerated in an appendix. Although the collection of them at Kew is very rich, they stand in a different position to the collection of recognised and well-determined species. Apart from their intrinsic beauty, which is often striking, they are of considerable scientific interest as showing the range of variation due to crossing and seminal reproduction. The amateurs and cultivators who have raised them have furnished them with Latin names, often cumbrous and fantastic, which have received no formal definition. They cannot, therefore, be fixed or quoted for any scientific purpose; they have in fact, the same relationship to the species from which they have originated as bedding pelargoniums bear to *Pelargonium zonale* or as the drumhead and other cabbages to *Brassica oleracea.*

Guide to Museum II.—An "Official Guide to the Museums of Economic Botany, No. II." has lately been issued. The building now known as No. II. Museum was the original starting point of the whole series of museums at Kew. The first guide to its contents was published by Sir William Hooker at his own cost in 1855. The foundation of the museum consisted of the director's private collections, some few objects already belonging to the garden, and some given by Mr. John Smith, whose son, Mr. Alexander Smith, received the appointment of Curator. In 1857 the collections illustrating the Dicotyledons and Gymnosperms were removed from No. II. to their present position in Museum No. I., opposite the Palm House. After that the collections illustrating Monocotyledons and the Cryptogams or flowerless plants were rearranged in Museum No. II. which was enlarged in 1881 by the addition of a small west wing. No. II. is at the northern end of the Herbaceous ground, three minutes' walk from No. I. The present guide is the first entirely devoted to Monocotyledons and Cryptogams. It contains notes on the Orchid, Ginger, Iris, Narcissus, and Lily orders and affords specially valuable information respecting the Palm order which furnishes the daily food, habitation and utensils of a large proportion of the human race. It deals with the economic productions of the *Gramineæ*, including all the cereals and the tropical bamboos. It discusses also the various uses of the Cryptogams, including the club-mosses, ferns, seaweeds and mushrooms. In order to render the Guide as comprehensive as possible references are given to articles on special subjects that have appeared from time to time in the *Kew Bulletin.*

Seeds of Juan Fernandez Plants.—Kew is indebted to Mr. J. Söhrens, of the Santiago Botanic Garden, for a quantity of seed of the *chonta*, the only palm (*Juania australis*) inhabiting the island. It is peculiar to Juan Fernandez, and is now almost confined to inaccessible situations. In addition there are twenty packets of seeds of other kinds of plants from the same source.

Cyathea medullaris.—An exceptionally tall specimen of this, the tallest of all the tree-ferns of New Zealand, has been for many years a striking feature in the Temperate house at Kew. It was presented by H.R.H. the late Prince Consort in 1856, and was then of considerable size, so that its age now would be something like 60 years. Early this year it showed symptoms of ill-health, and it finally collapsed at the end of June. Its stem was then 31 feet in length and a foot in diameter 3 feet from the ground. When in robust health it bore a head of about a dozen fronds, each from 12 to 15 feet long and about 6 feet broad. In the moist woods and ravines of New Zealand this species often attains a height of 60 feet; the caudex is slender, with a large conical base of hard root-fibres, closely matted together to the thickness of a yard or more. There are several handsome examples of this fern in the Temperate house still, one of which was presented to Kew by Lord Swansea in 1887 and is now about 20 feet high.

Juan Fernandez Sandal-wood.—The verification of the existence of a true sandal-wood in Juan Fernandez is recorded in the *Bulletin* for 1894, p. 110; and the receipt of a specimen (p. 372) from Professor F. Philippi, who described it from very imperfect material. Thanks to Mr. Söhrens, Kew now possesses excellent dried specimens of this most interesting plant (*Santalum fernandezianum*) collected by the donor himself. It is intended to give a figure and some further particulars of it in an early number of *Hooker's Icones Plantarum.* The following is an extract from Mr. Söhrens's letter on this subject:—

"It may be interesting to you to know that, after many years' search, only one live tree of the sandal wood has been found; which was in flower in the middle of April. I am going again to the island next week to endeavour to obtain cuttings of the tree. The height of the tree to the first branch is 5·4 m. The nearly horizontal branches prevented my measuring the total height, which may be about 8 m.; circumference 1·5 m. at 0·5 m. from the ground."

Achilus siamensis.—In the present volume of the *Bulletin*, p. 39, a description is given of a new scitamineous plant under the above name; and at p. 122, in the notes on the plants figured in *Hooker's Icones Plantarum* it is hinted that the flowers described and figured were abnormal. An examination of some specimens of Cambodian origin, communicated by the late Dr. H. Baillon, together with a re-examination of the materials upon which *Achilus* was founded, leave no doubt that such was the case, and that the plant in question, as suggested by Dr. Baillon, is a species of *Globba*, which is here re-named *Globba siamensis*, Hemsl. How far the figures in the *Icones Plantarum*, p. 2370, deviate from the normal condition of the plant can only be determined by a complete series of specimens. It is possible, however, that a part of the apparent abnormality is due to the imperfect and young condition of the flowers examined. Still, abnormalities exist. On this point Dr. Baillon wrote:—

"Nous avons beaucoup de cette plante. Sur bien des fleurs je vois non seulement le tube que vous figurez, mais encore une corolle tres grêle, à tube jaune fort tenu. Le labelle ne manque toujours. Seulement, il est très réduit en général."

With this he sends the specimens referred to above, including one perfect flower having a slender elongated corolla tube and the fully developed labellum and lateral staminodia of a normal *Globba*. Whether the Cambodian plant is specifically the same as the one from Siam is uncertain, but there are differences which can only be correctly appraised by comparison with perfect specimens of the latter.

Ferula alliacea.—Mr. F. W. Burbidge, F.L.S., Curator of Trinity College Botanic Garden, Dublin, has presented specimens, photographs, and water-colour sketches representing a plant cultivated in that garden under the above name. So far as the very imperfect authentic specimen of *Ferula alliacea*, Boiss., in the Herbarium goes, it agrees with the cultivated plant; and Boissier's description of the foliage confirms the view that this is its correct name. It is true that there are discrepancies between the description of the fruit and what is actually found; but these may perhaps be accounted for by the fact that sections of the fruit present very different appearances at different ages, so different indeed that in the absence of direct confirmatory evidence one might doubt their having been taken from a plant of the same genus. Should Mr. Burbidge succeed in obtaining quite ripe fruit, the plant will be fully illustrated in *Hooker's Icones Plantarum.* It is believed to be one of several species that yield the asafœtida of commerce.

Donn's Hortus Cantabrigiensis.—Spencer G. Perceval, Esq., of Bristol, has presented a handsome copy of the sixth edition of this work, of which the first edition appeared in 1796, and the thirteenth and last in 1845. The first seven editions were edited by James Donn, and successive editions were edited by F. Pursh (the author of the *Flora Americæ Septentrionalis*), John Lindley, George Sinclair, and P. N. Don. The first edition is still wanting at Kew.

Nature-Printing of Plants.—Since the note at p. 157 on Kniphof's *Herbarium Vivum* was published it has been possible to examine another copy of the work in question, and also Brükmann's letter, there referred to, on nature-printing; both in the library of the Botanical Department of the British Museum. It appears that Kniphof's work was issued with coloured figures; the *pict.* in Pritzel's description having been overlooked. With regard to the discoverer of the art of nature-printing, Brükmann (1733) states he remembered hearing that it was invented by Sherard and introduced from England into Germany in the preceding century. But a manuscript note in the copy of Brükmann's letter consulted, refers to Spiegel's *Isagoges in Rem Herbarium* (1606) where the process is described, so that neither of the Bushby Sherards could have been the inventor. In all probability a process of nature-printing was employed by amateurs years before any published work was issued.

Kew and the Colonies.—The following speech was delivered by the Marquis of Ripon, K.G., late Secretary of State for the Colonies, at the Anniversary Dinner of the Linnean Society, on the 24th May last:—

"I have to thank you very heartily for the reception you have given to the toast and also to my name. Sir Hugh Low has said that I have long been a Fellow of this Society, and I am not quite sure that I am not one of the oldest Fellows of this Society, because I am pretty old in age myself, and I became a Fellow of the Linnean Society when I was a very juvenile youth indeed. I therefore suspect that there are perhaps not very many members of the Society who have been longer in it than myself. But that recalls to my recollection, sir, the fact that I have been for many years a most unworthy member; I have been dealing with other things than natural science, and especially entomology, of which I used to be extremely fond, and I have not been able to pay any attention practically to those scientific subjects which so much interested me in my youth, and I have been so long absent from the meetings of this Society as to be totally unknown to you in the capacity of a Fellow.

"But it has been a great pleasure to me that this toast has been proposed by Sir Hugh Low He spoke in such singular, and I was going to say such misplaced, modesty of himself in proposing the toast, that you, who do not know so much about his career as I do, would be surprised to learn that he had been a most distinguished public servant.

During that career he has done most excellent work as an administrator. I also venture to think that he has considerably underrated his services to science.

"Now, with regard to the Colonies and to their connexion with science and with this Society, I may truly say that the members of this Society, particularly those who I believe are so numerous in it, and who give their special attention to botany, have done great service in many ways to the Colonies; and the importance of botanical science and all it can do to secure and promote prosperity in different regions has become, I am glad to say, much more recognised in public departments in these days than it used to be. Sir Hugh Low has spoken in most just terms of services which have been rendered to the Colonies, especially by Kew. I think my friend Mr. Thiselton Dyer will not contradict me when I say that he has more to do with the Colonial Office than with any other public department, and I was very glad to learn from him recently that he found the mode in which we transact our business in that department not unworthy of his praise. Great work has been done and is being done, mainly through the exertions of Mr. Thiselton Dyer and Mr. Morris and his assistants, to aid the Colonies in the introduction of new plants, and in the development and cultivation of those which naturally belong to them. In all directions this is the case to day. On the West Coast of Africa at the present moment it is being done. It is only, you may say, the commencement, but it is a commencement which is very satisfactory in its progress and in its results up to the present time, and which I hope may develope very largely in the future. Then, again, we all know that in the West Indies great work has been done by those men—men, most of them I ought to say, who have been sent out from Kew to those Colonies. In Jamaica there is the fruit cultivation, which has become every day more important, and which only requires the establishment of further lines of steamers between Jamaica and the United States to develope a still larger and more important trade. And again, almost all our natural products have been, through the agency of Kew, introduced in Jamaica. You, sir, have alluded to a matter upon which I do not want to dilate at the present moment—to our services in that part of the world in which you have been. I find that much goodwill has always existed among our friends in Kew; but we must bear in mind that one of the great works which has been undertaken by Kew is to educate the Colonies to recognise the nature of their various natural products, and the advantage of introducing new products. But when you come to introduce new products you encounter difficulties. There are cultivators of the old sort whose products are dying out, and whose particular industry is falling away; it is not very easy to induce those who are in that unfortunate condition to appreciate the labours of the man from Kew who comes down and introduces new plants into their Colony which they see are gradually ousting the old ones. But we must bear in mind that this work is done not only in the Colonies, properly so called, with which I am now connected, but also on a large scale in the great Dependency of which I once had the honour of being the head, in India. The great development in India of tea and cinchona has been of the most valuable kind. With regard to tea, look at India and Ceylon and see what has been done of late years. I have had some statistics placed before me which show that whereas, not much more than 10 years ago—possibly a little longer—the China tea was 66 per cent. of the whole tea consumed in the United Kingdom, it is now only 12 per cent., and its place has been taken by teas from India and

Ceylon (hear, hear), and that vast trade which has been so created has been due to the exertions of men of science, and of those who have gone forth from Kew for the purpose of developing and encouraging that cultivation. Take, again, the case of cinchona. My friend Sir Hugh Low and those who have been in those hot climates know there is nothing which preserves the health under trying circumstances more than that most blessed thing quinine. The development of the cinchona plant has been marvellously increased of late years. Not very long ago the cost of a small quantity of quinine was very considerable in India, and at all events, while it might be within the reach of the richer European there, it was altogether out of the reach of the native population. Now I understand that in Bengal, since I left India, you can get at any post-office five grains of quinine for less than a farthing. (Applause). I know my taste for quinine developed so much in those climates that I have not quite given it up since, and by its means I have kept the influenza at bay in these bad times. I feel, therefore, very grateful to those who have developed its cultivation.

"I had a curious proof the other day of the way in which plants of great value may be but little known to those who do not cultivate science, or are not engaged in those industries in which these plants are employed. I received a deputation from Leeds. Though most of you probably think only of Leeds as an important place for the production of cloth, yet there is a great leather trade in Leeds besides, and this deputation of leading men came to me to do what I could to help to increase the production of Gambier. They told me that they could not get on without it, that it was absolutely essential to their industry, and that it came shipped to them from Singapore. I believe the largest quantity is not grown in Singapore but from native states beyond. I am bound to say that until I had received this deputation, I had never heard of Gambier. I knew nothing about it. I had placed in my hands some most interesting reports of Mr. Ridley (whose name you have mentioned) about it, and I have written to the Governor of the place to see what can be done to increase the production and to improve the packing of the material in that country, and the transmission of it to this country. There is a proof, gentlemen, of the many various ways, some of which are very little known indeed to this country, in which botanical science especially may be of value to the populations of our various Colonies.

"I suppose, in spite of the Colonial development of other European countries which is going on so rapidly at the present time, that the British Empire will show a larger amount of various climates, of greater variety of flora and fauna, perhaps, than any other country in the world, and to say that is only to show how valuable a society of this kind must be, and how very unwise it would be for any man who has charge of the administration of our Colonies and of India, if he were not to endeavour to bring to bear for their benefit the vast discoveries of science to the utmost of his power (hear, hear). That I can assure gentlemen is my inclination. But you must remember that when the rupee will keep on going down, and when legislative assemblies will have crotchets, when they will say that the disease of the sugar-cane is a visitation of God, and ought to be taken away by the power that sent it, rather than by taking scientific means of getting rid of it, difficulties arise which are insurmountable by Colonial Secretaries. There were days when Colonial Secretaries were very powerful and despotic. I am bound to say they generally got the Colonies into hot water, and kept them there during their term of office, and when one man went out another kind of hot water was introduced by the next man. But it is not so much the case now, and I hope there is a better understanding than there was; but if so, it comes from our having been much more careful and considerate in dealing with the Colonists and even with their prejudices. Therefore you should never be hard upon the unfortunate Colonial Secretary. All I can say is, that I shall endeavour in that office to discharge the proper duties of a Fellow of the Linnean Society, and I know that I shall receive from the Institution at Kew the most valuable assistance in that undertaking. (Applause.)"

Manila-hemp Plants.—There are numerous varieties of *Musa textilis* yielding the Manila-hemp of commerce. The two better kinds are known in the Philippines as *lanoot betul* and *lanoot batang*. The stems of the latter are said to yield as much as one catty (about $1\frac{1}{3}$ lbs.) per stem. Great stress is laid on the fact that Manila plants can only be successfully grown in virgin soil, in partial shade, and with a regular rainfall. A writer in the *British North Borneo Herald*, 1 February 1894, states that "Anything less than a well distributed rain-fall of four "or five inches per month will stop their growth . . . even in the "Philippines there are districts too dry for them." If placed under unsuitable conditions the plants are said to revert to a stunted form known as *lanoot grotee*, yielding a small quantity of fibre or hardly any fibre at all. The cultivation and preparation of Manila-hemp have been fully discussed in the *Kew Bulletin*, 1887, April, pp. 1–4, and 1894, pp. 289–291 (with plate). Recently an interesting article with illustrations showing how the fibre is prepared appeared in the *Bulletin* of the Colonial Museum at Haarlem for March, 1895. It is stated that all the fibre exported at present is prepared by hand. Machines have often been tried, but owing to the abundant and cheap labour supplied by the natives it has been found more advantageous to continue the hand-cleaning methods. The enormous development which has taken place of late years in the Manila-hemp industry may be gathered from the fact that while the exports were only 126,000 piculs in 1841, they had increased in 1893 to 1,283,000 piculs. Manila-hemp is regarded as the most valuable of the white rope fibres which include Sisal and Mauritius hemp, Phormium and Sansevieria. Manila-hemp, in fact, governs the market in these commodities. Hitherto Manila-hemp plants have not thriven on a large scale outside the Philippine Islands. The character of the Manila-hemp plants grown at Kew and distributed to the West Indies and tropical Africa gave hopes that it might be possible to obtain plants with a more robust habit and capable of yielding a larger quantity of fibre. An application was made with this view to Mr. William Stigand, Her Majesty's Consul at Manila, who was good enough to obtain and forward to Kew a case containing 47 suckers "from a well-known grower." These arrived in November last. They yielded a number of strong healthy plants which so far promise to do much better under cultivation than the previous plants. Of the new sort it is intended to distribute a few to all the botanical establishments in the West Indies and West Africa, where they will receive special attention.

ROYAL GARDENS, KEW.

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CCCCLXXIV.—TROPICAL FODDER GRASSES—(continued).

An account of tropical fodder grasses was given in the *Kew Bulletin*, 1894, pp. 373–387. The information contained in it has been reproduced in many colonies, and evidently supplied a long-felt want. In the present article particulars of two grasses are kindly furnished by Mr. John Bovell, F.C.S., Superintendent of the Dodd's Botanical Station at Barbados. The first of these is known locally as "Sour grass," **Andropogon pertusus**, *Willd.*, a native of the tropical parts of the Old World, but now quite naturalized in the West Indies. The history of its introduction is not known. In Duthie's *Fodder Grasses of Northern India* it is thus described:—

"*A pertusus*, Willd. Perennial. Stems creeping at the base, erect above, bearded at the nodes. This grass, which is met with all over the plains of Northern India, is universally esteemed as a good fodder grass, both for grazing and stacking. In Australia also it is highly valued, being regarded as one of the best grasses to stand long droughts, while it will bear any amount of feeding. It is useful also as a winter grass if the weather is not too severe."

In Watt's *Dictionary of the Economic Products of India*, Vol. I., p. 249, Dr. Stewart is quoted as follows:—

"It is considered excellent fodder for bullocks, &c., and for horses when green." While Mr. Coldstream, of Hissar, adds:—"Good for stacking, will remain for 12 or 13 years; much stacked at the Hissar farm. Is especially grazed by buffaloes."

Dr. Voelcker in *Improvement of Indian Agriculture* (1893), p. 173, speaks of the same grass as follows:—

"Unless where distant forests are concerned, or where 'reserves' are sufficiently large to permit of grazing, I am in favour of grass being cut and removed rather than of its being fed off by stock. At *rukh* Jelleke (near Changa Manga) the people pay 1 rupee for the privilege of cutting and removing one head-load of grass each day during one month. At the Etawah 'reserve' the grass is cut by a contractor, and is sold on the spot for $\frac{3}{4}$ anna per head-load of about 100 lbs.; this is sold at 2

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annas in the village, and the price in Cawnpore is 6 annas. The grass is principally 'palwa' (*Andropogon pertusus*) a good feeding grass."

The success of this grass in Barbados is so marked as to attract general attention. Mr. C. A. Barber, F.L.S., late Superintendent of Agriculture in the Leeward Islands, in *Bulletin* XXXII., p. 168, states :—

"The appearance of the pastures in Barbados calls to mind more than anything I can remember in the tropics that of the English hay fields. The grass is clean and bright in colour. It is either grazed or regularly cut, and made into 'hay' for the cattle, or fed to them mixed with a little molasses and oil-cake. The grass universally used is the 'Sour grass.' This grass has been successfully introduced to the island of Nevis by the Hon. Joseph Briggs, where there are several fine fields of it already existing. For dry limestone soils this grass should prove of great value."

Mr. Bovell's account of Sour grass in Barbados is as follows :—

"The 'Sour grass' is the chief fodder grass of this island, where it is cultivated almost to the exclusion of all others. In the driest districts and on the most exposed places this hardy and excellent fodder plant, which grows from 18 inches to 2 feet high, seems to thrive and be at home, furnishing at the time of the year when other fodder is scarce food for the animals employed on the sugar estates. If cut shortly after it flowers, just as the fruit is setting, it forms valuable food for horses, cattle, and mules, who then seem to eat it with relish ; but if it is allowed to get over-ripe the stems become hard and unpalatable, the animals then only eating the leaves and tender parts unless it is chaffed up and given them with the addition of oil-cake and molasses. It is propagated by root cuttings, the cuttings being placed in holes about one foot apart each way, when it soon spreads, covering the whole surface of the land. It goes on ratooning for many years, giving two, and sometimes three, cuttings annually. The yield varies with the soil, rainfall, and manurial treatment, but the average yield, without manure, may be set down from 5 to 7 tons per acre per annum ; with the application of manure the yield is greatly increased, an acre then giving from 10 to 12 tons of fodder yearly. Until recently an acre of fairly good unmanured Sour grass was worth 3*l.* for the first cutting and 2*l.* for the second, the purchaser paying cost of cutting and loading ; lately, however, owing to the depreciation of the value of land, due to the fall in the price of sugar, an acre of Sour grass may be purchased for from 2*l.* to 4*l.* per acre for the two cuttings."

The second of the fodder grasses of Barbados is the "Hay-grass," Bouteloua juncifolia, *Lag.* (*B. litigiosa*, Lag.), a native of the West Indies and Central and South America. It is described by Grisebach (*Flora of the British West Indian Islands*, p. 537). It is found in Jamaica in the southern sandy districts, and is evidently a plant which thrives in hot dry plains. It has not hitherto been regarded as valuable for fodder purposes.

Mr. Bovell's account of it is as follows :—

"*Bouteloua juncifolia*, Lag.—A pasture grass growing in Barbados, principally on certain low-lying lands near the sea coast, where it affords excellent grazing during the rainy season, the animals, while it is obtainable, thriving on it without the addition of any other food; but

in the dry season it dies down, and the cattle would then starve had they nothing else to subsist on. In Barbados it is customary for those persons who rear cattle on the lands on which this grass is found, to take them to the sugar estates in the dry season, where they are fed on the tops of the sugar canes, which are at that time plentiful."

CCCCLXXV.—DIAGNOSES AFRICANÆ, VII.

(Continued from p. 153.)

The plants described below are the principal novelties of the collection of Somali-land plants briefly referred to in the current volume of the *Bulletin*, p. 158. Most of the plants were collected by Miss Edith Cole and Mrs. Lort Phillips, but these ladies were assisted by Mr. E. Lort Phillips, the leader of the expedition, and the other members of the party, Messrs. G. P. V. Aylmer and F. G. Gunnis, as well as by their native attendants, notably one Egga Nelayia. The country botanised lies immediately south of Berbera, extending to the Golis range of mountains, which rises to an altitude of 5900 feet; and it was here where the majority of the plants was collected. In this part the vegetation is luxuriant and varied, and there is evidently yet a rich field for the explorer. From a series of photographs brought home by the party, it is evident that the country in many places is covered with forest, the scenery is both curious and attractive, and the country generally is by no means of the desert character commonly assumed. The present collection consists of about 350 species, of which 69, including three new genera, were previously undescribed. Among the new generic types *Cyclocheilon* (*Scrophularineæ*) is the most noteworthy. It is distinguished by a very remarkable calyx, which is divided through the median plane, almost to the base, into two equal reniform-orbicular segments. Among the living plants and bulbs brought home by the party are several novelties, including one or two species of *Eulophia*, of which there are dried inflorescences. These will be described when they flower.

257. **Farsetia longistyla**, *Baker* [Cruciferæ]; annua, e basi ramosissima, caulibus gracilibus pilis albis adpressis strigosis, foliis caulinis remotis subsessilibus linearibus integris utrinque dense albo-strigosis, racemis laxissimis paucifloris, pedicellis brevibus ascendentibus strigosis, sepalis oblongis strigosis, petalorum limbo parvo oblongo purpureo, fructu lineari plano parce strigoso, valvis membranaceis nervo centrali obscuro præditis, stylo elongato, seminibus orbicularibus distincte alatis.

Habitat.—Somali-land: Goetten, *Miss Edith Cole, Mrs. Lort Phillips.*

Caulis sesquipedalis. *Folia* inferiora, 1½–2 poll. longa. *Sepala* 2 lin. longa. *Fructus* 9–12 lin. longus, 2 lin. latus. *Stylus* 2 lin. longus.

Near *F. stenoptera*, Hochst. (F. grandiflora, *Jaub. et Spach*) Differs by its smaller flowers and longer style.

258. **Polygala somaliensis**, *Baker* [Polygalaceæ]; perennis, glabra, ramulis firmis viridibus virgatis, foliis sparsis subsessilibus lanceolatis

acutis firmis uninerviis, racemis paucis multifloris laxis omnibus lateralibus, bracteis minutis caducis lanceolatis, sepalis exterioribus oblongis margine albidis interioribus oblongis obtusis albidis venis viridibus anastomosantibus, petalis albis sepalis interioribus æquilongis, fructu suborbiculari-compresso.

Habitat.—Somali-land : Golis range at Dara-as, *Miss Edith Cole.*

Folia inferiora 9–12 lin. longa. *Sepala* exteriora 1½ lin. longa, interiora 3½ lin. longa.

Nearly allied to *P. Fischeri*, Gürke.

259. **Arenaria vestita**, *Baker* [Caryophylleæ] ; perennis, e basi ramosissima, caulibus diffusis gracilibus dense glanduloso-pubescentibus, foliis remotis sessilibus linearibus acutis pubescentibus, floribus in cymas laxas terminales dispositis, pedicellis elongatis, sepalis lanceolatis pubescentibus, petalis oblongis acutis rubellis sepalis æquilongis, staminibus petalis brevioribus antheris parvis oblongis, ovario globoso.

Habitat.—Somali-land : Golis range near Dara-as, alt. 5000 ft., *Miss Edith Cole*, *Mrs. Lort Phillips.*

Folia 6–9 lin. longa. *Sepala* et *petala* 2 lin. longa.

260. **Abutilon molle**, *Baker* [Malvaceæ] ; fruticosum, ramulis pilis stellatis mollibus dense vestitis, foliis petiolatis cordato-orbicularibus cuspidatis argute dentatis utrinque dense molliter pilosis, floribus in paniculas laxas terminales dispositis, pedicellis erecto-patentibus, sepalis ovatis dense pilosis, petalis oblongis aurantiacis calyce triplo longioribus, carpellis 10 fructiferis apice minute cuspidatis ab axi demum secedentibus secus dorsum bifidis.

Habitat.—Somali-land : plains below the Golis range, *Miss Edith Cole*, *Mrs. Lort Phillips.*

Frutex 2–4 pedalis. *Folia* 1½–2½ poll. longa et lata. *Sepala* 2 lin. longa. *Petala* 6 lin. longa. *Carpella* fructifera 4 lin. longa.

Allied to *A. fruticosum*, Guill. et Perott.

261. **Hibiscus argutus**, *Baker* [Malvaceæ] ; suffruticosus, ramulis virgatis lignosis pilis adpressis albidis strigosis, foliis breviter petiolatis oblongis acutis argute dentatis facie viridibus parce pilosis dorso dense pilosis venis elevatis, floribus ad axillas foliorum superiorum solitariis pedunculatis, bracteis multis setaceis hispidis calyce longioribus, sepalis ovatis, petalis oblongis coccineis calyce 6-plo longioribus, staminibus petalis paulo brevioribus antheris globosis luteis, stylis 5 elongatis patulis, stigmate parvo capitato.

Habitat.—Somali-land : Golis range, *Mrs. Lort Phillips.*

Folia inferiora 12-18 lin. longa. *Calyculi* bracteæ 3–4 lin. longæ. *Sepala* 1½ lin. longa. *Petala* 9–10 lin. longa. *Fructus* ignotus.

Near *H. micranthus*, L. & H. *crassinervius*, Hochst.

262. **Turræa lycioides**, *Baker* [Meliaceæ] ; fruticosa, ramulis lignosis virgatis sursum pubescentibus, foliis sessilibus minutis oblanceolatis obtusis integris subcoriaceis utrinque obscure strigosis sæpe ad nodos fasciculatis, floribus axillaribus solitariis breviter pedunculatis, calycis pilosi tubo campanulato lobis parvis ovatis, petalis ligulatis calyce 6–8-plo longioribus, tubo filamentorum cylindrico petalis vix breviore, antheris ovatis ad faucem tubi sessilibus, stylo protruso apice stigmatoso ampulliformi.

Habitat.—Somali-land: Golis range at Dooloob, ***Miss Edith Cole, Mrs. Lort Phillips.***

Folia majora 3–4 lin. longa. *Calyx* ½ lin. longus. *Petala* 3–4 lin. longa.

263. **Rhus myriantha**, *Baker* [Anacardiaceæ]; arborea, ramulis glabris, foliis petiolatis digitatim trifoliolatis rigide coriaceis glabris, foliolis oblongis obtusis integris penninerviis venulis primariis arcuatis ad marginem parallelis, foliolo centrali majore ad basin attenuato lateralibus inæquilateralibus, floribus in paniculam amplam terminalem ramulis compositis dispositis, pedicellis brevibus, bracteis ovatis minutis, sepalis ovatis parvis, fructu globoso nitido monospermo.

Habitat.—Somali-land: Golis range at Woob, ***Mrs. Lort Phillips.***

Foliolum terminale 3–3½ poll. longum, 1½ poll. latum. ***Panicula*** pedalis, 9–10 poll. diam. *Fructus* 2 lin. diam.

264. **Lupinus somaliensis**, *Baker* [Leguminosæ]; perennis, ramulis dense pubescentibus, foliis longe petiolatis, stipulis setaceis magnis pubescentibus, foliolis 9–13 oblanceolatis obtusis minute cuspidatis facie viridibus glabris dorso molliter albo-pilosis, racemis multifloris superne densis, pedicellis brevibus erecto-patentibus, bracteis parvis dense pubescentibus, calycis dense molliter pilosi tubo brevissimo dentibus longis lanceolatis, petalis saturate cœruleis glabris calyce sesqui-longioribus, vexillo orbiculari, ovario cylindrico pubescente multiovulato.

Habitat.—Somali-land: rocks above Dara-as, Golis range, alt. 5000 ft., ***Miss Edith Cole, Mrs. Lort Phillips.***

Foliolum centrale 2 poll. longum, 3–4 lin. latum. ***Calyx*** 6 lin. longus. *Corolla* 9 lin. longa. *Vexillum* 6 lin. latum. ***Fructus*** ignotus.

Near ***L. varius*** and ***L. pilosus***, Linn.

265. **Crotalaria Phillipsiæ**, *Baker* [Leguminosæ]; fruticosa, ramulis gracilibus parce adpresse pilosis, stipulis parvis caducis, foliis petiolatis trifoliolatis facie viridibus glabris dorso adpresse pilosis, foliolis subsessilibus obovatis obtusis basi cuneatis, racemis laxis longe pedunculatis terminalibus et axillaribus, pedicellis brevibus, bracteis subulatis minutis, calycis pubescentis tubo campanulato dentibus lanceolatis vel deltoideis tubo æquilongis, petalis luteis glabris calyce duplo longioribus, vexillo obovato venis nigris multis percurso, ovario cylindrico multiovulato.

Habitat.—Somali-land: Golis range at Dara-as, ***Mrs. Lort Phillips.***

Foliola 8–10 lin. longa et lata. *Calyx* 3 lin. longus. ***Petala*** 6 lin. longa. ***Fructus*** ignotus.

266. **Crotalaria aurantiaca**, *Baker* [Leguminosæ]; fruticosa, ramulis glabris, stipulis minutis caducis, petiolo elongato, foliis trifoliolatis firmulis utrinque viridibus glabris, foliolis linearibus obtusis minute cuspidatis brevissime petiolulatis, racemis laxis terminalibus pedunculatis, pedicellis calyce longioribus, bracteis minutis setaceis, calycis glabri tubo campanulato dentibus lanceolatis tubo æquilongis, petalis magnis aurantiacis glabris, ovario cylindrico glabro multiovulato, stylo elongato curvato.

Habitat.—Somali-land: Golis range at Hammar, ***Miss Edith Cole, Mrs. Lort Phillips.***

Foliola 12–18 lin. longa, 3 lin. lata. *Petioli* interdum 3–4 poll. longi. *Calyx* 3 lin longus. *Petala* pollicaria; vexillum 9–10 lin. latum. *Stylus* 6–7 lin. longus. *Fructus* ignotus.

Near *C. intermedia*, Kotschy.

267. **Crotalaria leucoclada**, *Baker* [Leguminosæ]; fruticosa, ramulis lignosis dense persistenter albo-incanis, stipulis minutis lanceolatis pubescentibus deciduis, foliis longe petiolatis trifoliolatis utrinque viridibus obscure pubescentibus foliolis lineari-oblongis obtusis minute emarginatis basi attenuatis, floribus in racemos multifloros subdensos terminales dispositis, pedicellis erecto-patentibus incanis calyci æquilongis, bracteis minutis lanceolatis, calycis pubescentis tubo brevi campanulato dentibus lanceolatis vel lanceolato-deltoideis tubo longioribus, petalis aurantiacis glabris calyce 2–3-plo longioribus, vexillo obovato, carina alis paulo longiore, ovario cylindrico pubescente multiovulato, stylo elongato curvato glabro deorsum applanato.

Habitat.—Somali-land: Golis range, alt. 3000 ft., *Mrs. Lort Phillips.*

Foliolum terminale 9–12 lin. longum, 4 lin. latum. *Calyx* 3 lin. longus. *Petala* 6-7 lin. longa. *Fructus* ignotus.

Near *C. striata*, DC.

268. **Indigofera tritoides**, *Baker* [Leguminosæ]; herbacea, perennis, ubique persistenter albo-incana, caulibus primariis patulis ramosissimis, ramulis erecto-patentibus, stipulis lanceolatis persistentibus, foliis brevissime petiolatis digitatim trifoliolatis firmulis utrinque albo-incanis, foliolis oblanceolatis minute cuspidatis obscure petiolulatis e medio ad basin sensim attenuatis, racemis axillaribus densis longe pedunculatis, pedicellis calyci æquilongis, bracteis lanceolatis pilosis, calycis dense albo-strigosi tubo campanulato dentibus deltoideis tubo æquilongis, petalis rubellis glabris calyce 2–3-plo longioribus, ovario lineari multiovulato.

Habitat.—Somali-land: Golis range, near Dara-as, *Miss Edith Cole.*

Foliola 6–9 lin. longa, 1½–2 lin. lata. *Calyx* vix 1½ lin. longus. *Petala* 3 lin. longa. *Fructus* ignotus.

No other species with digitately trifoliolate leaves is known in Tropical Africa, but there are several at the Cape.

269. **Crassula Coleæ**, *Baker* [Crassulaceæ]; annua, erecta, e basi ramosa, caulibus brevibus fragilibus dense pubescentibus, foliis sessilibus oblongis acutis integris basi cuneatis carnosis utrinque viridibus dense pubescentibus, cymis laxis paucifloris terminalibus, pedicellis erectis elongatis pubescentibus, floribus pentameris, sepalis erectis pubescentibus lanceolatis basi coalitis, petalis oblongis rubellis calyce paulo longioribus, staminibus petalis paulo brevioribus, carpellis demum petalis æquilongis, stylis brevibus erectis, seminibus oblongis brunneis.

Habitat.—Somali-land: Golis range, near Dara-as, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia inferiora 9–12 lin. longa, 3–4 lin. lata. *Calyx* 1½ lin. longus. *Petala* 2 lin. longa.

270. **Kalanchoe somaliensis**, *Baker* [Crassulaceæ]; perennis, carnosa, glabra, caule erecto stricto elongato, foliis crassis sessilibus inferioribus

obovato-cuneatis crenatis utrinque viridibus brunneo-marmoratis superioribus lanceolatis parvis, floribus in paniculam laxam corymbosam terminalem dispositis, pedicellis longis erectis, sepalis ovato-lanceolatis liberis, corollæ albæ tubo cylindrico elongato basi ventricoso lobis patulis ovato-lanceolatis, genitalibus in tubo inclusis.

Habitat.—Somali-land: Golis range, near Wardie, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia inferiora 1½–2 poll. longa, 12–15 lin. lata. *Sepala* 3 lin. longa. *Corollæ* tubus 3–3½ poll. longus, basi 3–4 lin. diam.; lobi 6 lin. longi.

Near the Abyssinian *K. marmorata*, Baker (*K. grandiflora*, A. Rich. non W. & A.).

271. **Momordica dissecta**, *Baker* [Cucurbitaceæ]; perennis, e basi ramosissima, caulibus gracilibus glabris patulis, cirrhis parvis gracillimis simplicibus, foliis brevissime petiolatis deltoideis bipinnatis lobis lanceolatis vel oblongis basi attenuatis, floribus masculis lateralibus pedunculatis sæpissime solitariis, bracteis orbicularibus viridibus persistentibus, floribus in axillis bractearum subsessilibus, calycis lobis deltoideis tubo campanulato æquilongis, corollæ luteæ basi atropurpureæ lobis obovatis, floribus femineis fructuque ignotis.

Habitat.—Somali-land: Golis range at Djedainio, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia 12–18 lin. longa et lata, lobis 1½–3 lin. latis. *Bracteæ* 6 lin. latæ. *Calyx* 2 lin. longus. *Corolla* pollicaris.

Nearly allied to *M. cissampeloides*, Klotzsch.

272. **Pentas glabrescens**, *Baker* [Rubiaceæ]: fruticosa, ramulis glabratis junioribus leviter pubescentibus, stipulis parvis deltoideis, foliis membranaceis oblongis acutis breviter petiolatis ad basin attenuatis utrinque viridibus facie glabris dorso obscure pubescentibus, floribus ad apices ramulorum paucis aggregatis, ovario oblongo, calycis lobis lanceolatis foliaceis, corollæ rubellæ tubo elongato cylindrico lobis patulis oblongis, antheris ex tubo protrusis.

Habitat.—Somali-land: Golis range, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia majora 2 poll. longa, medio 8–9 lin. lata. *Calycis* lobi 2 lin. longi. *Corollæ* tubus pollicaris; lobi 4 lin. longi.

Differs mainly from *P. pauciflora* by its smaller more numerous flowers.

273. **Pentas pauciflora**, *Baker* [Rubiaceæ]; fruticosa, ramulis pubescentibus, stipulis deltoideis, foliis breviter petiolatis oblongis acutis ad basin attenuatis membranaceis utrinque viridibus obscure pubescentibus, floribus ad apices ramulorum solitariis vel paucis, ovario oblongo, calycis lobis magnis lanceolatis foliaceis pubescentibus, corollæ albæ tubo cylindrico elongato, limbi lobis 5 parvis oblongis, staminibus in tubo incluso, stylo protruso ramis cylindricis.

Habitat.—Somali-land: Golis range, near Goetten, *Miss Edith Cole.*

Folia majora 2–3 poll. longa, 12–15 lin. lata. *Calycis* lobi 3 lin. longi. *Corollæ* tubus 2½–3 poll. longus: lobi 3 lin. longi.

274. **Oldenlandia rotata**, *Baker* [Rubiaceæ]; perennis, caulibus erectis strictis virgatis glabris, foliis in verticillis more Galii congestis sessilibus linearibus uninerviis patulis rigidulis glabris, floribus axillaribus pedunculatis solitariis vel geminis, ovario oblongo, calycis lobis 4 lineari-subulatis ovario longioribus, corollæ albæ tubo cylindrico elongato lobis 4 patulis oblongo-lanceolatis, antheris ex tubo brevissime protrusis.

Habitat.—Somali-land: Golis range, *Miss Edith Cole*, *Mrs. Lort Phillips.*

Folia 12–18 lin. longa, ½–1 lin. lata. *Calycis* lobi 1½–2 lin. longi. *Corollæ* tubus 18 lin. longus; lobi 4 lin. longi.

Combines the habit of a *Galium* with the floral structure of an *Oldenlandia.*

275. **Vernonia amplexicaulis**, *Baker* [Compositæ]; fruticosa, ramulis persistenter albo-incanis, foliis tenuibus crenulatis facie viridibus obscure pubescentibus dorso dense pubescentibus junioribus albo-incanis superioribus oblongo-spathulatis amplexicaulibus inferioribus oblongis obtusis, petiolo ad basin anguste alato, capitulis multifloris purpureis paucis terminalibus corymbosis, pedunculis elongatis nudis albo-incanis, involucro campanulato bracteis lineari-subulatis multiseriatis dense pilosis intimis exceptis squarrosis, achænio angulato pubescente, pappi setis albidis corollæ tubo æquilongis.

Habitat.—Somali-land: Golis range, *Miss Edith Cole*, *Mrs. Lort Phillips.*

Folia inferiora 2–3 poll. longa. *Involucrum* 6 lin. diam. *Pappus* 2 lin. longus.

276. **Vernonia gomphophylla**, *Baker* [Compositæ]; fruticosa, ramosissima, ramulis lignosis albo-incanis, foliis alternis vel fasciculatis parvis obovatis integris emarginatis vel minute cuspidatis facie tenuiter dorso dense albo-incanis, capitulis paucis terminalibus umbellatis vel corymbosis, pedicellis pubescentibus erectis involucro longioribus, involucro campanulato multifloro bracteis pauciseriatis adpressis exterioribus ovatis pubescentibus interioribus glabris linearibus, achænio angulato pubescente, pappi setis firmulis albis corollæ tubo æquilongis.

Habitat.—Somali-land: Golis range, *Miss Edith Cole.*

Folia 4–6 lin. longa. *Involucrum*, 2 lin. diam., 1½ lin. longum *Pappus*, 1½ lin. longus.

Near the South Arabian *V. atriplicifolia*, Jaub. et Spach.

277. **Vernonia cryptocephala**, *Baker* [Compositæ]; frutex parvus, ramulis dense persistenter albo-incanis, foliis sessilibus linearibus rigidis uninerviis confertis ascendentibus utrinque persistenter albo-incanis, capitulis magnis multifloris ad apices ramulorum sessilibus foliis suboccultis, involucro campanulato bracteis multiseriatis adpressis rigidis obtusis dorso incanis exterioribus sensim brevioribus, achænio angulato pubescente, pappi setis albis rigidulis tubo corollæ æquilongis.

Habitat.—Somali-land: Golis range, at Dara-as, alt. 5000 ft., *Miss Edith Cole*, *Mrs. Lort Phillips.*

Folia 6–8 lin. longa, 1 lin. lata. *Involucrum* 5–6 lin. diam. *Pappus* 3 lin. longus.

278. **Pulicaria Aylmeri**, *Baker* [Compositæ]; fruticosa, ramosissima, ramulis subtiliter pubescentibus, foliis distincte petiolatis ovatis

profunde irregulariter crenatis utrinque viridibus pubescentibus, capitulis terminalibus solitariis vel paucis corymbosis, involucro campanulato bracteis pauciseriatis omnibus elongatis linearibus pilosis, floribus omnibus discoideis hermaphroditis, corollæ luteæ tubo cylindrico lobis minutis ovatis, achænio pubescente, pappi setis corollæ tubo æquilongis.

Habitat.—Somali-land: Golis range, Daimolek peak, alt. 4000 ft., *Mr. G. P. V. Aylmer.*

Folia 4–6 lin. longa. *Involucrum* 4 lin. longum. *Pappus* 3 lin. longus.

Near the Abyssinian *P. podophylla*, Jaub. et Spach.

279. **Senecio basipinnatus**, *Baker* [Compositæ]; fruticosus, sarmentosus, ramulis gracilibus glabris, foliis breviter petiolatis ovato-deltoideis membranaceis facie viridibus obscure pubescentibus dorso magis pubescentibus dentibus inæqualibus deltoideis inferioribus majoribus basi lyrato-pinnatis lobis basalibus quadratis, capitulis multifloris radiatis in paniculam laxam terminalem ramis corymbosis dispositis, pedicellis minute bracteatis ascendentibus vel cernuis, involucro campanulato leviter pubescente bracteis 10–12 linearibus exterioribus paucis parvis laxis, ligulis luteis involucro brevioribus, achænio glabro, pappo albo flexili.

Habitat.—Somali-land: Golis range, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia inferiora 2–3 poll. longa. *Involucrum* 4 lin. diam. *Pappus* 2 lin. longus.

Nearly allied to *S. deltoideus*, Less.

280. **Senecio (Kleinia) longipes**, *Baker* [Compositæ]; caule crasso cylindrico inermi, foliis carnosis planis sessilibus oblongis acutis integris glabris apice deltoideis ad basin angustatis, pedunculo stricto erecto ad medium folio valde reducto solum prædito, capitulis 2 homogamis multifloris terminalibus magnis, involucro campanulato glabro bracteis circiter 12 erectis lanceolatis æqualibus apice et margine membranaceis dorso conspicue sulcatis, floribus fulvis, corollæ lobis lanceolatis, achænio cylindrico glabro, pappo albo flexili corollæ tubo æquilongo.

Habitat.—Somali-land: Golis range. *Miss Edith Cole.*

Folia majora 4–5 poll. longa, 1½ poll lata. *Pedunculus* pedalis et ultra. *Involucrum* 6–8 lin. diam., bracteis 5–6 lin. longis. *Corollæ* tubus 5–6 lin. longus; lobi 1 lin. longi.

281. **Senecio (Kleinia) Gunnisii**, *Baker* [Compositæ]; caule crasso cylindrico subdecumbente aculeis parvis conicis albidis armato, foliis nullis, pedunculis monocephalis gracilibus brevibus nudis, capitulis solitariis homogamis discoideis, involucro oblongo glabro bracteis 10–12 linearibus æqualibus erectis, floribus fulvis, achænio cylindrico glabro, pappo albo flexili corollæ tubo æquilongo.

Habitat.—Somali-land: Golis range, in dry sandy rocky ground, *Miss Edith Cole, Mrs. Lort Phillips.*

Caulis 4–6 lin. diam. *Pedunculi* 2–3 poll. longi. *Involucrum* 6 lin. diam., bracteis 8–9 lin. longis. *Pappus* 8 lin. longus.

282. **Carduncellus cryptocephalus**, *Baker* [Compositæ]; perennis, caulibus crebre foliatis, foliis sessilibus lanceolatis rigidis ascendentibus

spinis stramineis duris erecto-patentibus armatis apice pungentibus, capitulis magnis ad apices ramulorum sessilibus solitariis foliis ascendentibus occultis, involucro campanulato bracteis multiseriatis rigidis adpressis interioribus linearibus exterioribus infra spinam magnam pungentem obtusis, pappi setis interioribus mollibus elongatis plumosis exterioribus brevioribus lanceolatis cuspidatis.

Habitat.—Somali-land : Golis range, *Mrs. Lort Phillips.*

Folia inferiora 2 poll. longa, 2 lin. lata. *Involucrum* 6 lin. diam. *Pappus*, 6 lin. longus.

Adds this Mediterranean and Oriental genus to the Tropical African flora.

283. **Centaurea (Microlonchus) Aylmeri,** *Baker,* [Compositæ]; herbacea, perennis, foliis utrinque dense persistenter albo-incanis caulinis sessilibus linearibus integris basalibus rosulatis profunde pinnatifidis lobis linearibus, caule elongato incano monocephalo, pedunculo elongato nudo stricto, involucro campanulato, bracteis multiseriatis rigidis adpressis viridibus apice nigris acutis exterioribus ovatis intimis lanceolatis, corollis pallide rubris tubo cylindrico lobis linearibus, achænio piloso, pappi paleis multis linearibus obtusis achænio longioribus.

Habitat.—Somali-land : Golis range, alt. 5000 ft., *Mrs. Lort Phillips, Mr. G. P. Aylmer.*

Folia basalia 1½–2 poll. longa. *Involucrum*, 8 lin. diam., bracteis intimis 8–9 lin. longis. *Flores* exteriores 1 poll. longi. *Pappus* 2 lin. longus.

Near *C. somaliensis*, Oliver et Hiern.

284. **Statice xipholepis,** *Baker* [Plumbagineæ]; perennis, cæspitosa, basi suffruticosa, foliis radicalibus parvis rigide coriaceis albidis obovatis obtusis vel emarginatis in petiolum sensim angustatis, pedunculo brevi nudo, floribus 1–3-nis in spicis laxis paniculatis dispositis bracteis exterioribus parvis ovatis centralibus oblongo-lanceolatis navicularibus acuminatis duris persistentibus interioribus lanceolatis margine scariosis, calycis tubo cylindrico ore albo patulo scarioso dentibus 5 lanceolatis, petalis parvis oblongis obtusis integris lilacinis.

Habitat.—Somali-land : *Miss Edith Cole, Mrs. Lort Phillips.*

Folia cum petiolo 1½ poll. longa, 3-4 lin. lata. *Bracteæ* centrales 4–4½ lin. longæ. *Calycis* tubus 2 lin. longus.

Near *S. macrorhabdos*, Boiss. and *S. Griffithii*, Aitch. et Hemsl.

285. **Jasminum somaliense,** *Baker* [Oleaceæ]; fruticosum, sarmentosum, ramulis sursum pubescentibus, foliis petiolatis trifoliolatis subcoriaceis utrinque viridibus glabris, foliolis petiolulatis ovatis apice deltoideis basi late rotundatis, floribus in cymas corymbosas multifloras terminales aggregatis, pedicellis brevibus pubescentibus, bracteis parvis lanceolatis, calyce pubescente tubo campanulato dentibus deltoideis tubo brevioribus, corollæ tubo cylindrico calyce 8–9 plo longiori, lobis 5–6 oblanceolato-oblongis tubo distincte brevioribus, genitalibus in tubo inclusis.

Habitat.—Somali-land : Golis range at Dara as, alt. 5000 ft., *Miss Edith Cole, Mrs. Lort Phillips.*

Foliola 12–18 lin. longa. *Calyx* 1 lin. longus. *Corolla* tubus 9 lin. longus ; lobi 6 lin. longi.

Near *J. mauritianum*, Bojer and *J. auriculatum*, Vahl.

286. **Asclepias Phillipsiæ**, *N. E. Brown* [Asclepiadeæ]; fruticosa ramosa, ramis incano-pubescentibus, foliis linearibus acutis parce puberulis, umbellis e nodis lateralibus pedunculatis 5–6 floris, pedunculis pedicellis bracteis linearibus acutis sepalis lanceolatis acuminatis incano-pubescentibus, corolla profunde 5-loba rotata lobis elliptico-ovatis acutis glabris in uno margine ciliatis, coronæ lobis paulo supra columnæ staminum basin exortis et columnæ apicem attingentibus complicatis subquadratis angulis rotundatis cum dentibus falcatis denticulatis abrupte reflexis ad angulos interiores intus ecornutis, folliculis lanceolatis acuminatis parce setosis puberulis.

Habitat.—Somali-land, without locality, *Mrs. Lort Phillips.*

Folia 1½–3½ poll. longa, ½–¾ lin. lata. *Pedunculi* 5–7 lin. longi. *Bracteæ* 2½–3½ lin. longæ. *Pedicelli* 4½–5 lin. longi. *Sepala* 1½–2½ lin. longa. *Corollæ* lobi 3 lin. longi, 1¾ lin. lati. *Coronæ* lobi 1–1¼ lin. longi, ¾ lin. lati.

287. **Asclepias integra**, *N. E. Brown* [Asclepiadeæ]; fruticosa ramosa, ramis erectis albis pedunculis pedicellis sepalis corollis que extus albo-tomentosis, foliis ascendentibus linearibus acutis mucronatis marginibus revolutis glabris junioribus albo-tomentosis, umbellis e nodis lateralibus pedunculatis 5–8-floris, sepalis ovatis vel ovato-lanceolatis acutis, corolla profunde 5-loba lobis elliptico-ovatis subacutis, coronæ lobis ad basin staminum columnæ vel paulo supra exortis et quam columna subduplo longioribus erectis complicatis oblique ovato-oblongis integris apice oblique rotundatis intus ecornutis, folliculis basi ovoideo-inflatis deinde in rostrum longum attenuatis junioribus albo-tomentosis demum pruinosis (vel glabratis?), seminibus rugosis.

Habitat.—Somali-land: Adda Gallah, *James & Thrupp;* Golis Range, *Mrs. Lort Phillips;* Hammar, *Miss Edith Cole.* Kilimanjaro: *Smith, Volkens* 567; Lanjora, 2000 ft., *Johnston.*

Frutex 4–5 ped. alta. *Folia* 2½–6 poll. longa, ½–1 lin. lata. *Pedunculi* ¾–1 poll. longi. *Pedicelli* 6–10 lin. longi. *Sepala* 1–1½ lin. longa, ½–¾ lin. lata. *Corollæ* lobi 3–5 lin. longi, 2–3 lin. lati. *Coronæ* lobi 2–3 lin. longi, 1½–2 lin. lati. *Folliculi* 1¾ poll. longi.

The corolla appears to be of a yellowish-white or greenish-white, and the corona brownish-ochre in the dried state.

288. **Caralluma Edithæ**, *N. E. Brown* [Asclepiadeæ]; ramis robustis erectis succulentis quadrangularibus glabris angulis grosse dentatis dentibus patentibus vel plus minusve retrorsis apice induratis, umbellis terminalibus globosis 60–70-floris, bracteis parvis subulatis, pedicellis glabris, sepalis subulatis attenuatis apice revolutis glabris, corollæ tubo brevi campanulato utrinque glabro lobis deltoideo-ovatis acutis patentibus extus glabris intus tuberculato-rugosis glabris ad apicem tantum penicillo pilorum instructis nec ciliatis, corona exteriore cupulari 5-loba glabra lobis bifidis segmentis subulatis basi contiguis deinde arcuato-divergentibus, coronæ exterioris lobis linearibus obtusis antheris incumbentibus coronæ exterioris dorso adnatis glabris.

Habitat.—Somali-land: *Miss Edith Cole.*

Rami 1 poll. crassi. *Pedicelli* 9 lin. longi. *Sepala* 2½–3 lin. longa. *Corollæ* lobi 2–2½ lin. longi et lati. *Coronæ* exterioris lobi ½–¾ lin. longi; coronæ interioris lobi ½ lin. longi.

A very fine species, very similar to *C. retrospiciens*, N. E. Brown, but the corolla is glabrous, with only a tuft of trembling hairs at the very apex of the lobes, and the corona is also quite glabrous; the flowers are of a dark purple-brown.

289. **Edithcolea,** *N. E. Brown* [Asclepiadearum Stapeliearum genus novum]. *Calyx* 5-partitus. *Corollæ* tubus parvus; limbus magnus, rotatus, 5-lobus, lobi valvati. *Corona* duplex, columnæ staminum affixa; lobi coronæ exterioris breves, patentes, emarginato-bifidi, intus concavi vel saccati; lobi coronæ interioris antheris oppositi, erecti, lineares, apicibus triangulari-dilatis conniventibus echinulatis. *Columna staminea* prope basin corollæ affixa; antheræ erectæ, oblongæ, exappendiculatæ; pollinia in quoque loculo solitaria, erecta, apice pellucida. Stylus apice subcompressus, truncatus, brevissime bicorniculatis. Folliculos non vidi.—*Herba* succulenta, ramosa, aphylla, caules angulati, angulis spinoso-dentatis. *Flores* prope apicem ramorum enati, pedicillati, magni.

This genus is allied to *Caralluma*, but the very large corolla with a relatively very small tube, and somewhat different corona, easily distinguish it.

E. grandis, *N. E. Brown*; ramis basi decumbentibus pentagonis glabris angulis dentatis dentibus late deltoideis apice induratis pungentibus, floribus prope apicem ramorum subsolitariis, pedicello crasso glabro, sepalis ovato-lanceolatis accuminatis glabris, corollæ tubo parvo campanulato intus extusque glabro oris margine elevato plicato-rugoso, limbo maximo plano vel patelliformi usque ad medium 5-lobo extus glabro intus in disco concentrice lamellato-rugoso et lineis quinque radiantibus pilorum longorum clavato-capitatorum munito, lobis ovatis acutis vix rugosis a pilis tenuibus clavatisque hirtis atque ciliatis, coronæ exterioris lobis subpatentibus transverse oblongis emarginato-bifidis concavis intus hirtis, interioris erectis late linearibus basi gibbosis apice triangulari-dilatis inflexo-conniventibus echinulatis glabris quam columna staminum styloque multo longioribus.

Habitat.—Somali-land: Henweina Valley, about 3000 ft., *Miss Edith Cole, Mrs. Lort Phillips.*

Pedicelli 7–9 lin. longi, 1¼–1½ lin. crassi. *Sepala* 4 lin. longa, 1–1¼ lin. lata. *Corolla* 4–5 poll. diam., tubo 3 lin. longo latoque, lobis 1½–2 poll. longis, 1–1¼ poll. latis. *Coronæ* exterioris lobi ¼–⅓ lin. longi, interioris lobi ¾ lin. longi.

Miss Cole states that the plant grows to about a foot in height, and that the branches are decumbent at the base and very stout, being an inch or more in diameter. The habit of the plant is something like that of *Stapelia gigantea*, N. E. Br.

290. **Heliotropium albo-hispidum,** *Baker* [Boragineæ]; perenne, caule basi lignoso ramosissimo, ramulis pilis albis hispidis adpressis dense vestitis, foliis sessilibus linearibus margine revolutis utrinque dense albo-hispidis, racemis laxis elongatis, bracteis lineari-subulatis persistentibus, pedicellis brevibus erectis, sepalis linearibus hispidis, corollæ tubo cylindrico calyci æquilongo intus dimidio superiore luteo-piloso, lobis minimis orbicularibus patulis antheris glabris subsessilibus lineari-oblongis, stylo in tubo incluso.

Habitat.—Somali-land: Golis range at Hammar, *Miss Edith Cole.*

Folia inferiora 6–9 lin. longa. *Calyx* 1½ lin. longus. *Corollæ* limbus 1½ lin. diam.

Near *H. strigosum*, Willd.

291. **Trichodesma stenosepalum,** *Baker* [Boragineæ]; suffruticosum, ramulis gracilibus albo-incanis sursum setis albidis erecto-patentibus hispidis, foliis caulinis parvis sessilibus oblanceolatis integris margine revolutis setis albis utrinque dense hispidis, cymis brevibus paucifloris terminalibus ramosis, pedicellis calyce longioribus, bracteis parvis linearibus, calycis tubo brevissimo segmentis linearibus dense hispidis, corollæ tubo brevi lobis lanceolatis acuminatis, antheris glabris appendicibus rectis.

Habitat.—Somali-land: Golis range, *Miss Edith Cole.*

Folia inferiora 5-6 lin. longa. *Calyx* 3 lin. longus. *Corolla* 4 lin. longa.

Near *T. heliocharis,* S. Moore.

292. **Convolvulus sphærophorus,** *Baker* [Convolvulaceæ]; annua, caulibus brevibus gracilibus patulis vel suberectis pubescentibus, foliis inferioribus breviter petiolatis lineari-oblongis integris basi attenuatis utrinque tenuiter pilosis superioribus oblongis obtusis basi rotundatis, floribus in glomerulos sessiles terminales et laterales dense molliter albo-pilosos aggregatis, sepalis lineari-oblongis, corolla late infundibulari sepalis paulo longiore limbo patulo vix lobato, staminibus corolla paulo brevioribus.

Habitat.—Somali-land: foot of Golis range, alt. 1200 ft., *Miss Edith Cole.*

Folia inferiora 9–12 lin. longa, superiora 3–4 lin. longa. *Sepala* 2 lin. longa. *Corollæ* limbus 3 lin. diam.

Near *C. glomeratus,* Choisy.

293. **Convolvulus (Astrochlæna) Phillipsiæ,** *Baker* [Convolvulaceæ); perennis, sarmentosa, caulibus sterilibus pilis stellatis albidis dense vestitis, foliis late ovatis cordatis integris facie tenuiter dorso dense albido-incanis, floribus in axillis foliorum solitariis vel geminis breviter pedunculatis, sepalis ovato-oblongis obtusis imbricatis dorso dense incanis, corollæ lilacinæ tubo oblongo extus glabro limbo patulo obscure lobato, genitalibus in tubo inclusis, staminibus inæqualibus, stylo staminibus longioribus breviore lobis stigmatosis oblongis patulis.

Habitat.—Somali-land: Golis range (the type and a variety with short suberect stems and smaller flowers), *Mrs. Lort Phillips.*

Folia majora 1½ poll. longa et lata. *Sepala* 2–2½ lin. longa. *Corolla* limbus expansus 15 lin. diam.; tubus 9 lin. longus.

Near *C. malvaceus,* Oliver and *C. hyoscyamoides,* Vatke.

294. **Ipomœa (Orthipomœa) cicatricosa,** *Baker* [Convolvulaceæ]; fruticosa, caulibus argenteo-incanis cicatricibus foliorum delapsorum rugosis, foliis breviter petiolatis ovatis obtusis integris basi rotundatis facie viridibus obscure canescentibus dorso persistenter argenteo-incanis, floribus sessilibus in axillis foliorum solitariis, sepalis subæqualibus lanceolatis dense albo-sericeis, corollæ tubo oblongo rubro-purpureo extus sericeo limbo obscure lobato, staminibus corolla 3–4-plo brevioribus.

Habitat.—Somali-land: Golis range, *Miss Edith Cole, Mrs. Lort Phillips.* Adda Galla, *James* and *Thrupp.*

Folia 12-15 lin. longa, 8–9 lin. lata. *Sepala* 3 lin. longa. *Corolla* 18–21 lin. longa.

295. **Ipomœa (Strophipomœa) heterosepala**, *Baker* [Convolvulaceæ]; late volubilis, caulibus gracilibus pubescentibus, foliis longe petiolatis cordato-ovatis acuminatis membranaceis utrinque viridibus tenuiter pubescentibus, floribus solitariis axillaribus breviter pedunculatis, sepalis inæqualibus membranaceis acutis pubescentibus exterioribus cordato-ovatis, corollæ tubo extus pubescente late infundibulari calyce quadruplo longiore limbo patulo vix lobato, stylo corolla duplo breviore.

Habitat.—Somali-land: Golis range at Dara-as, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia majora 3–4 poll. longa, 2½–3 poll. lata. *Sepala* 6–7 lin. longa. *Corolla* 2 poll. longa.

Near *I. sagittata*, Ker (Bot. Reg. tab. 437).

296. **Verbascum (Lychnitis) somaliense**, *Baker* [Scrophularineæ]; caule stricto elato stellato-pubescente, foliis utrinque dense persistenter albido-pannosis inferioribus majoribus petiolatis oblongis obtusis crenulatis basi cuneatis superioribus parvis sessilibus cordato-ovatis acutis, paniculæ ramis elongatis dense pubescentibus, floribus solitariis vel glomeratis sessilibus vel brevissime pedicellatis, bracteis ovatis acutis foliaceis pannosis, sepalis ovato-lanceolatis acutis dense pannosis, corollæ luteæ tubo campanulato lobis orbicularibus tubo æquilongis, staminibus brevibus antheris 4 reniformibus terminalibus, fructu globoso piloso.

Habitat.—Somali-land: Golis range, *Miss Edith Cole, Mrs. Lort Phillips.* Native name, Balamha.

Folia inferiora 9–10 poll. longa. *Calyx* 3 lin. longus. *Corollæ* limbus 5 lin. diam.

Near *V. sinaiticum*, Benth.

297. **Linaria patula**, *Baker* [Scrophularineæ]; perennis, diffusa, glabra, caulibus rectis gracilibus ramosis, foliis brevissime petiolatis remotis linearibus integris patulis firmulis utrinque viridibus basi angustatis, floribus ad axillas foliorum solitariis longe pedunculatis, sepalis lanceolatis margine scariosis albis, corolla magna lutea calcare ad apicem sensim attenuato labiis brevibus superiore rotundato integro inferiore trilobato palato citrino piloso, fructu globoso.

Habitat.—Somali-land: Golis range near Widaba, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia 1–2 poll. longa. *Sepala* 1½ lin. longa. *Corolla* 10–12 lin. longa. *Fructus* magnitudine pisi.

Belongs to the section *Elatinoides*, near *L. macilenta*, Decne.

298. **Cyclocheilon**, *Oliv.* [Scrophularinearum-Gerardiearum genus novum]. *Calyx* herbaceus, subetubulosus, lateraliter bilabiatus vel potius in plano mediano fere bipartitus, labiis vel segmentis reniformi-orbiculatis integerrimis. *Corolla* bilabiata, calycem superans tubo oblique ampliato, labio superiore bilobato, labio inferiore trilobato, lobis patentibus omnibus subæqualibus rotundatis, lobo centrali labii inferioris cæteris paullo minore. *Stamina* didynama, inclusa; filamenta laxe pilosa; antheræ liberæ, glabræ v. basi tantum pilosæ, loculis æqualibus divergentibus breviter mucronatis. *Ovarium* biloculare, glabrum, ovoideo-globosum, compressiusculum; ovula anatropa in loculis geminata, oblique collateralia; stylus gracilis, apice oblique stigmatiferus. *Capsula* * * *

C. **somaliense,** *Oliv.*; fruticulosum divaricatim ramosum, ramulis rectis pilis brevibus albidis patentibus cano-hispidulis, foliis oppositis parvis breviter petiolatis oblanceolatis obovatis v. ellipticis obtusis integris hispidulis, floribus in axillis foliorum solitariis breviter pedunculatis bibracteolatis, bracteolis obovato-rotundatis parvis calycis segmentis arcte applicitis.

Habitat.—Somali-land: *Mrs. Lort Phillips.*

Folia 2 lin. longa, 1 lin. lata. *Calycis* lobi 4–5 lin. diam. *Corolla* 6 lin. longa; lobi 3 lin. lati.

299. **Phillipsia,** *Rolfe* [Acanthacearum genus novum]. *Calyx* elongato-tubulosus, 5-angulatus, apice 5-dentatus. *Corollæ* tubus longe cylindraceus, apice in faucem brevem paululo ampliatus; limbus subæqualis, patens, lobis 5 brevibus rotundatis contortis. *Stamina* 4, subæqualia, ad medium faucis affixa, subexserta, filamentis gracilibus, antheræ oblongæ, loculis æqualibus parallelis muticis. *Discus* inconspicuus. *Stylus* gracilis, apice crassiusculus; ovula in quoque loculo 2. *Capsula* calyce clauso inclusa, oblongo-linearis, acuta. *Semina* 4, plano-compressa, retinaculo brevi fulta.

P. **fruticulosa,** *Rolfe*; herba perennis ramosa v. fruticulosa, ramulis tetragonis cinereis asperulis, foliis breviter petiolatis suborbicularibus obscure crenulatis minute pubescentibus pilis curvatis, floribus axillaribus solitariis subsessilibus, bracteolis linearibus parvis.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips.*

Folia 2–5 lin. longa. *Calyx* 5–7 lin. longus; lobi 1½–2 lin. longi. *Corollæ* tubus 9 lin. longus; lobi 2 lin. longi. *Capsula* 5–6 lin. longa.

A very distinct genus belonging to the tribe *Ruellieæ*, allied to *Satanocrater* and *Physacanthus*, but readily distinguished by the narrow tubular calyx, shrubby habit and very small leaves. The corolla is most like the latter genus, but has much smaller lobes. The habit is peculiar in the group, and, like the Arabian genus *Bentia*, in the tribe *Justicieæ*, is evidently an adaptation to the dry climate.

300. **Asystasia Coleæ,** *Rolfe* [Acanthaceæ]; herba diffusa, ramis tetragonis pubescentibus, foliis petiolatis ovatis v. elliptico-ovatis obtusis v. subobtusis repando-crenulatis pubescentibus, floribus in spicis terminalibus dispositis, bracteis ovato-lanceolatis acutis pubescentibus, bracteolis paulo parvioribus, calycis tubo brevissimo lobis lineari-lanceolatis acuminatis pubescentibus, corollæ tubo subcampanulato basi paulo contracto intus nervis barbatis lobis inæqualibus rotundatis patentibus, staminibus brevibus filamentis barbatis, ovario hirsuto, stylo apice glabro, stigmate bidenticulato, capsula oblonga acuta stipitata, seminibus 4 suborbiculatis plano-compressis rugulosis cinereis.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips, Miss Edith Cole.* Adda Galla, *James* and *Thrupp.*

Folia ½–3 poll. longa, ¼–1½ poll. lata; petiolus 2–8 lin. longus. *Spicæ* 1–2½ poll. longæ. *Bracteæ* 6–9 lin. longæ. *Bracteolæ* 5–7 lin. longæ. *Calyx* 4–5 lin. longus, *Corolla* ¾–1 poll. longa. *Capsulæ* 10–12 lin. longæ. *Semina* 2 lin. lata.

Allied to *Asystasia rostrata*, Solms, but a stouter plant, with much larger flowers and fruit.

301. **Lantana concinna,** *Baker* [Verbenaceæ]; fruticosa, ramosissima, ramulis gracillimis pubescentibus, foliis oppositis petiolatis ovatis

crenatis rugosis utrinque viridibus supra obscure subtus dense pubescentibus, capitulis globosis ad axillas foliorum solitariis longe pedunculatis, bracteis oblongis foliaceis pubescentibus ascendentibus, calyce parvo, corollæ tubo cylindrico piloso lobis orbicularibus patulis.

Habitat.—Somali-land: Golis range, near Widaba, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia 6–9 lin. longa. *Capitula* 5–6 lin. diam., bracteis 3 lin. longis. *Pedunculi* 1–2 poll. longi. *Corollæ* tubus 2 lin. longus.

Near L. *microphylla*, Franchet Sert, Somal. 49.

302. **Ocimum staminosum,** *Baker* [Labiatæ]; suffruticosum, ramulis pilis albis brevibus patulis vestitis, foliis petiolatis ovato-oblongis subintegris vel obscure crenulatis utrinque pubescentibus, racemis laxis elongatis, verticillastris paucifloris, pedicellis brevissimis demum deflexis, bracteis parvis oblongis foliaceis persistentibus, calyce piloso tubo campanulato dente superiore orbiculari decurrente reliquis brevibus cuspidatis, corollæ tubo cylindrico calyci æquilongo labio superiore oblongo inferiore superiore paulo longiore, staminibus exsertis filamentis glabris basi haud appendiculatis, stylo staminibus longiore.

Habitat.—Somali-land: Golis range, Sheik's pass, alt. 3000–4000 ft., *Miss Edith Cole.*

Folia inferiora 1½–2 poll. longa. *Calyx* fructiferus 2 lin. longus. *Corolla* 4 lin. longa. *Stamina* 4 lin. longa.

Habit of the Abyssinian *O. menthæfolium,* Hochst.

303. **Ocimum verticillifolium,** *Baker* [Labiatæ]; fruticosum, ramulis adpresse pubescentibus, foliis subsessilibus linearibus integris acutis rigidulis ad basin sensim attenuatis utrinque viridibus obscure pubescentibus sæpissime in verticillos fasciculatis, racemis laxis simplicibus terminalibus, verticillastris 5–6-floris, pedicellis brevissimis, bracteis minutis, calycis pubescenti tubo campanulato dente superiore orbiculari-decurrente lateralibus subnullis inferioribus parvis subulatis, corollæ tubo calyci florifero æquilongo labiis tubo brevioribus, staminibus longe exsertis filamentis basi haud appendiculatis.

Habitat.—Somali-land: Golis range at Guldoo Hammed, *Miss Edith Cole, Mrs. Lort Phillips.*

Suffrutex bipedalis. *Folia* centralia 6–9 lin. longa, ¾ lin. lata. *Calyx* demum 3 lin. longus. *Corolla* 4 lin. longa. *Stamina* 9–12 lin. longa.

304. **Coleus vestitus,** *Baker* [Labiatæ]; perennis, ramis pilis albis patulis dense vestitis, foliis petiolatis ovatis crenatis crassiusculis utrinque dense pubescentibus, racemis laxis elongatis, verticillastris 5–6-floris, pedicellis calyci florifero æquilongis, bracteis parvis ovatis foliaceis, calycis pubescentis tubo campanulato dentibus tubo æquilongis supremo ovato reliquiis lanceolatis, corollæ tubo calyci florifero æquilongo labio superiori parvo orbiculari inferiore magno oblongo-naviculari unguiculato, staminibus labio inferiori æquilongis.

Habitat.—Somali-land: Golis range, alt. 3000 feet, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia 1–1½ poll longa. *Calyx* fructiferus 2½–3 lin. longus. *Corollæ* labium inferum 5–6 lin. longum.

Near *C. barbatus,* Benth. and *C. lanuginosus,* Hochst.

305. **Coleus gomphophyllus**, *Baker* [Labiatæ]; perennis, ramis dense pubescentibus, foliis distincte petiolatis obovato-cuneatis leviter crenatis membranaceis utrinque pubescentibus, racemis laxis elongatis, verticillastris ebracteatis 10–12-floris, pedicellis calyce longioribus, calycis pubescentis tubo campanulato dente supremo ovato acuto marginibus decurrentibus dentibus inferioribus lanceolato-deltoideis supremo æquilongis, corollæ tubo calyci florifero æquilongo labio superiore parvo inferiore magno oblongo-naviculari, staminibus labio inferiore brevioribus.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips.*

Folia inferiora 1½–2 poll. longa. *Calyx* fructiferus 3 lin. longus. *Corollæ* labium inferum 4–5 lin. longum.

Near *C. lanuginosus*, Hochst. and *C. barbatus*, Benth.

306. **Orthosiphon calaminthoides**, *Baker* [Labiatæ]; suffruticosum, ramosissimum, ramulis pubescentibus, foliis parvis petiolatis ovatis subobtusis crenatis utrinque viridibus pubescentibus, racemo simplice laxo elongato, verticillastris 2–6-floris, pedicellis calyce longioribus, bracteis minutis, calyce pubescente tubo cylindrico dentibus omnibus perparvis superioribus ovatis obtusis infimo lineari, corollæ tubo cylindrico calyce duplo longiori labiis parvis superiore minore inferiore lingulato, staminibus labio inferiore brevioribus, stylo apice stigmatoso integro.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips.*

Folia 4–5 lin. longa. *Calyx* floriferus 1½ lin. longus. *Corollæ* tubus 3 lin. longus, labium inferum 1½ lin. longum.

307. **Orthosiphon molle**, *Baker* [Labiatæ]; perenne, ramulis dense pubescentibus, foliis breviter petiolatis ovatis obtusis crenatis basi late rotundatis utrinque dense pubescentibus, racemo laxo simplici, verticillastris 5–6-floris, pedicellis brevibus, bracteis minutis, calycis pubescenti tubo campanulato dente supremo ovato lateralibus lanceolato-deltoideis infimis parvis lanceolatis, corollæ tubo subcylindrico pubescente calyce florifero triplo longiore lobis parvis oblongis, staminibus labio inferiore vix brevioribus.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips.*

Folia 3–4 lin. longa. *Calyx* floriferus 1 lin. longus. *Corollæ* tubus 3 lin. longus, labiis 1 lin. longis.

308. **Ballota fruticosa**, *Baker* [Labiatæ]; fruticosa, ramosissima, ramulis dense albido-incanis, foliis minutis petiolatis orbicularibus crenatis subcoriaceis supra viridibus obscure pubescentibus subtus dense persistenter albo-incanis venis primariis elevatis, floribus solitariis sessilibus axillaribus, calycis tubo infundibulari 10-costato limbo obliquo lato breviter dentato demum patulo scarioso.

Habitat.—Somali-land: Golis range, *Miss Edith Cole.*

Folia 2 lin. longa et lata. *Calyx* fructiferus 6 lin. longus, limbo 4 lin. diam. *Corolla* ignota.

309. **Leucas (Ortholeucas) Jamesii**, *Baker* [Labiatæ]; suffruticosa, ramulis pubescentibus, foliis distincte petiolatis lanceolatis vel oblongo-lanceolatis acutis integris supra tenuiter subtus dense pubescentibus, verticillastris multifloris distantibus foliis magnis suffultis, pedicellis brevibus, bracteis propriis subulatis minutis, calycis tubo infundibulari

incano 10 costato ore æquali dentibus parvis deltoideis, corollæ tubo cylindrico calyci æquilongo labio superiore oblongo dense piloso tubo æquilongo labio inferiore breviore, staminibus inclusis.

Habitat.—Somali-land: Golis range, *Miss Edith Cole*, *Mrs. Lort Phillips.* Collected previously by *James* and *Thrupp.*

Folia inferiora 2–2½ poll. longa, medio 6 lin. lata. *Calyx* 2 lin. longus.

310. **Leucas (Loxostoma) paucijuga,** *Baker* [Labiatæ]; perennis, caulibus gracilibus pubescentibus, foliis paucis remotis ovatis profunde crenatis basi rotundatis utrinque viridibus pubescentibus, verticillastris paucis paucifloris foliis magnis suffultis, pedicellis, subnullis, bracteis propriis parvis rigidis lineari-subulatis, calycis tubo infundibulari 10-costato piloso ore obliquo latere inferiore producto dentibus parvis deltoideis, corollæ tubo cylindrico calyci æquilongo labio superiore lingulato tubo æquilongo extus dense piloso inferiore parvo, staminibus labio superiori æquilongis.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips.*

Folia 9–12 lin. longa. *Calyx* 4 lin. longus. *Corollæ* labium superum 3–4 lin. longum.

Near *L. microphylla*, Vatke.

311. **Leucas (Loxostoma) thymoides,** *Baker* [Labiatæ]; perennis, ramulis gracilibus pubescentibus, foliis parvis ovatis crenatis petiolatis utrinque dense pubescentibus, verticillastris paucis paucifloris foliis parvis suffultis, pedicellis brevissimis, bracteis propriis minutis subulatis rigidis, calycis tubo infundibulari piloso 10-costato ore obliquo latere inferiore producto dentibus lanceolatis parvis, corollæ tubo cylindrico labio superiore lingulato tubo æquilongo extus dense albo-piloso labio inferiore breviore trilobato, staminibus corollæ labio superiori æquilongis.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips.*

Folia 3–4 lin. longa. *Calyx* 4 lin. longus. *Corolla* 7–8 lin. longa.

This also is nearly allied to *L. microphylla*, Vatke.

312. **Leucas (Loxostoma) Coleæ,** *Baker* [Labiatæ]; perennis, caule brevi erecto ramoso pubescente, foliis breviter petiolatis ovatis acutis crenatis utrinque viridibus pubescentibus, verticillastris densis multifloris, pedicellis brevissimis, bracteis longis linearibus ascendentibus conspicue ciliatis, calycis tubo subcylindrico piloso 10-costato ore obliquo latere inferiore producto dentibus parvis deltoideis cuspidatis, corollæ tubo cylindrico calyci æquilongo labio superiore oblongo parvo extus dense piloso labio inferiore minore, staminibus corollæ labio superiori æquilongis.

Habitat.—Somali-land: Golis range, *Miss Edith Cole.*

Folia 6-9 lin. longa. *Bracteæ* propriæ 3 lin. longæ. *Calyx* 4 lin. longus. *Corolla* 6 lin. longa.

313. **Paronychia (Anoplonychia) somaliensis,** *Baker* [Illecebraceæ]; perennis, dense cæspitosa, foliis sessilibus linearibus acutis glabris rigidulis ascendentibus, stipulis magnis albis lanceolatis scariosis, floribus in capitula terminalia globosa aggregatis, bracteis magnis albis ovatis acutis scariosis albis flore longioribus, perianthii segmentis 5

oblongo-lanceolatis acutis rigidis pubescentibus viridibus albo-marginatis, staminibus perianthio duplo brevioribus, ovario parvo ovoideo.

Habitat.—Somali-land: Golis range at Wardie, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia 2–3 lin. longa. *Perianthium* 1–1½ lin. longum. *Bracteæ* 3 lin. longæ.

Near *P. capitata*, Lam.

314. **Jatropha palmatifida,** *Baker* [Euphorbiaceæ]; fruticosa, glabra, stipulis subulatis rigidis apice glanduliferis, foliis longe petiolatis profunde palmatifidis lobis 5 oblongo-oblanceolatis obtusis dimidio superiore dentatis inferne integris ad basin attenuatis, petiolo nudo, floribus in paniculam longe pedunculatam ramulis apice dense cymosis dispositis, bracteis oblongis pectinato-serratis dentibus apice glanduliferis, sepalis oblongis acutis, petalis ovatis acutis calyce duplo longioribus, fructu globoso nudo trilobato, stylis ad basin liberis.

Habitat.—Somali-land: Golis range, *Mrs. Lort Phillips.*

Folia 2 poll. longa, 3 poll. lata. *Petala* 1½ lin. longa.

315. **Habenaria (Bonatea) Phillipsii,** *Rolfe* [Orchideæ]; herba elata, foliis caulinis sessilibus oblongis v. elliptico-oblongis acutis v. abrupte et brevissime acuminatis, racemis circa 7-floris, bracteis ovato-lanceolatis acuminatis, sepalo postico late lanceolato acuto, lateralibus petalorum lobis anticis labello et processubus stigmaticis elongatis omnibus adnatis, sepalis lateralibus sursum explanatis triangulari-falcatis apiculatis deflexis, petalis profunde bipartitis lobo postico libero falcato-lineari lobo antico elongato-lineari, labello trifido lobis linearibus intermedio breviore, calcari elongato pedicello longiore supra medium paululo dilatato, columna brevi, rostello galeato apiculato basi incurvo antheræ basi adnato et in lobos 2 laterales longissimos rectos ascendentes producto, anthera erecta, loculis parallelis, polliniis lineari-oblongis, caudiculis longissimis filiformibus, processibus stigmaticis spathulatis.

Habitat.—Somali-land: Golis range, at Dara-as, in deep gorge near water, *Mr. E. Lort Phillips.* "Flower white and green."

Herba 2 ped. alta. *Folia* 2–5 poll. longa, ¾–1½ poll. lata. *Bracteæ* 1–1¼ poll. longæ. *Pedicelli* 2½ poll. longi. *Sepala* 10 lin. longa, posticum 3 lin. latum, lateralia 4 lin. lata. *Petalorum* lobus posticus 10 lin. longus, anticus 1¾ poll. longus. *Labellum* 2½ poll. longum. *Calcar* 3½ poll. longum. *Rostellum* 3 poll. longum, lobi laterales 8 lin. longi. *Anthera* 4 lin. longa. *Stigmatis* processus 11 lin. longi.

A fine species belonging to the section *Bonatea*, and allied to *Habenaria Kayseri*, Kränzl., from the Usambara district.

316. **Hæmanthus (Gyaxis) somaliensis,** *Baker* [Amaryllideæ]; caule foliifero breviter producto, foliis tribus membranaceis oblongis acutis ad basin angustatis, venis primariis venulis copiosis transversalibus sæpe anastomosantibus connexis, scapo elongato, bracteis oblongis membranaceis diu ascendentibus, pedicellis elongatis, perianthii tubo cylindrico lobis subulatis ascendentibus tubo æquilongis, staminibus perianthii lobis longioribus filamentis filiformibus rubellis antheris parvis oblongis luteis, fructu globoso glabro.

Habitat.—Somali-land; top of Golis range, alt. 5900 ft., *Miss Edith Cole, Mrs. Lort Phillips.*

Folia synanthia, semipedalia, 2 poll. lata. *Scapus* 5–8-pollicaris. *Bracteæ* 15 lin. longæ. *Corollæ* tubus 3–4 lin. longus. *Filamenta* 9 lin. longa. *Fructus* magnitudine pisi.

Nearly allied to the well-known *H. puniceus*, L. of the Cape.

317. **Vellosia (Xerophyta) acuminata,** *Baker* [Amaryllideæ]; fruticosa, foliis sessilibus linearibus acuminatis rigide coriaceis costa marginibusque incrassatis stramineis venis 10–12 crebris inter costam et marginem præditis, scapo gracili elongato viscoso, ovario oblongo nigro-viscoso, perianthii lobis oblongo-lanceolatis albis dorso glandulosis, staminibus 6 perianthio duplo brevioribus.

Habitat.—Somali-land: Golis range, in rocky watercourses near Woob, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia pedalia, inferne 4 lin. lata. *Perianthii* lobi 8–9 lin. longi.

318. **Chlorophytum tenuifolium,** *Baker* [Liliaceæ]; foliis basalibus 5–6 linearibus elongatis membranaceis glabris interdum crispatis, scapo elongato nudo simplice, racemo laxo cylindrico, pedicellis brevibus erecto-patentibus apice articulatis, bracteis minutis ovato-lanceolatis, perianthii segmentis linearibus albis viridi-carinatis, filamentis subulatis elongatis antheris lanceolatis parvis, ovario globoso stylo elongato, fructu globoso acuto angulato apice emarginato.

Habitat.—Somali-land: Golis range, at Widaba, *Miss Edith Cole, Mrs. Lort Phillips.*

Folia pedalia vel sesquipedalia, 4–6 lin. lata. *Racemus* demum subpedalis, pedicellis inferioribus 2–3 lin. longis. *Perianthium* 5 lin. longum. *Fructus* 4 lin. diam.

319. **Ornithogalum (Beryllis) sordidum,** *Baker* [Liliaceæ]; foliis pluribus elongatis linearibus synanthiis glabris, scapo elongato, racemo multifloro superne denso inferne laxo, pedicellis brevibus ascendentibus vel patulis, bracteis linearibus persistentibus, perianthii segmentis oblongis dorso viridibus margine albidis, staminibus perianthio paulo brevioribus filamentis conformibus linearibus antheris parvis luteis, stylo ovario oblongo æquilongo stigmate capitato.

Habitat.—Somali-land: Golis range, Woob, *Miss Edith Cole.*

Bulbus ignotus. *Folia* pedalia vel sesquipedalia, inferne 3–4 lin. lata. *Pedunculus* sesquipedalis et ultra. *Racemus* semipedalis. *Perianthium* 3 lin. longum.

Near *O. Eckloni*, Schlecht.

320. **Iphigenia somaliensis,** *Baker* [Liliaceæ]; caule elongato flexuoso gracili glabro, foliis caulinis 8–10 sessilibus linearibus acuminatis graminoideis glabris superioribus sensim brevioribus, floribus in axillis foliorum superiorum solitariis pedunculis brevibus erectis, perianthii segmentis 6 subulatis viridibus flore expanso patulis, staminibus ovario brevioribus antheris parvis oblongis, ovario oblongo stylis tribus brevibus falcatis, fructu obovoideo trilobato apice emarginato perianthio breviore.

Habitat.—Somali-land: Golis range, near Widaba, *Miss Edith Cole Mrs. Lort Phillips.*

Bulbus ignotus. *Caulis* pedalis. *Folia* majora 6–8 poll. longa inferne 2 lin. lata. *Perianthium* 6 lin. longum.

Very near the Indian and North Australian, *I. indica*, Kunth.

321. **Cyanotis somaliensis**, *C. B. Clarke* [Commelinaceæ]; sericeo-villosa, foliis oblongis apice breviter triangularibus apiculatis, spicis terminalibus ac pluribus axillaribus distantibus sessilibus.

Habitat.—Somali-land: *Mrs. Lort Phillips, Miss Edith Cole.*

Caules centrales steriles abbreviati, laterales 6–12 poll. longi, spicis axillaribus 5–10 distantibus. *Folia* $1\frac{1}{2}$ poll. longa, $\frac{2}{3}$ poll. lata, plana, apice parum acuminata. *Capsula* non visa.

Very near the South African *C. nodiflora* Kunth, but the leaves do not match any of this group—they resemble those of *C. cristata*, Roem. et Schult.

322. **Kyllinga microstyla**, *C. B. Clarke* [Cyperaceæ]; pergracilis, spicis 3, spiculis numerosis minimis 1-floris, stylo vix ullo ramis $\frac{1}{3}$ nucis vix æquilongis, nuce lateraliter compressa glumæ fere æquilonga.

Habitat.—Somali-land: *Mrs. Lort Phillips.*

Glabra. *Culmi* cæspitosi, 3–6 poll. longi, basi vaginis pluribus angustis incrassati. *Folia* plura, $\frac{1}{2}$ culmi æquilonga, $\frac{1}{2}$ lin. lata. *Bracteæ* 3, patulæ, ima 2 poll. longa. *Spica* centralis 2 lin. longa, 1 lin. lata, 2 laterales 1 lin. longæ et latæ. *Spicula* $\frac{1}{2}$ lin. longa, lateraliter compressa, 3-gluma, decidua, viridis. *Stamina* 2–1, antheræ breviter oblongæ. *Nux* obovoideo-ellipsoidea, obtusa, levis.

Resembles exceedingly small examples of *K. triceps*, Rottb.

323. **Cyperus somaliensis**, *C. B. Clarke* [Cyperaceæ]; culmo tenuiore monocephalo, foliis $\frac{1}{3}$—$\frac{3}{4}$ culmi æquilongis setaceis vaginis minute dense pubescentibus, spiculis parvis ovoideis compressis albo-luteis 4–8-floris in unicum caput dense compositis, stylo 3-fido, nuce triquetra obovoidea $\frac{2}{5}$ glumæ æquilonga.

Habitat.—Somali-land: *Mrs. Lort Phillips, Miss Edith Cole.*

Culmi 4–6 poll. longi, basi vaginis indurati, in rhizomate perbrevi glomerati. *Folia* modo fere glabra, modo dense pubescentia. *Caput* $\frac{1}{3}$ poll. in diam.; bracteæ 2, inferior 2 poll. longa. *Spiculæ* $\frac{1}{6}$—$\frac{1}{4}$ poll. longæ. *Glumæ* obtusæ, multistriatæ, tenues. *Antheræ* lineari-oblongæ, luteæ, exsertæ, conspicuæ. *Stylus* nuci æquilongus; rami 3 stylo æquilongi. *Nux* inæqualis, curvata, brunescens.

Near *C. leucocephalus*, Retz.

324. **Mariscus somaliensis**, *C. B. Clarke* [Cyperaceæ]; radicibus fibrosis, culmis cæspitosis tenuibus basi vaginis tumidis cylindrice incrassatis monocephalis, spica brevi densa 6–14-stachya, spiculis linearibus 12–16-floris castaneis, glumis valide multistriatis apice lanceolatis subaristatis paullo recurvatis.

Habitat.—Somali-land: *Mrs. Lort Phillips.*

Glabra. *Culmi* 4–8 poll. longi. *Folia* $\frac{1}{2}$–$\frac{2}{3}$ culmi æquilonga, setacea, debilissima. *Caput* $\frac{2}{3}$–1 poll. in diam. *Spiculæ* $\frac{1}{2}$ poll. longæ, 1–$1\frac{1}{2}$ lin. latæ. *Nux* non maturata.

Near *M. leptophyllus*, *C. B. Clarke*, but glumes subaristate.

325. **Pellæa lomarioides**, *Baker* [Filices]; dense cæspitosa, paleis basalibus densis linearibus firmulis medio nigris margine brunneis, stipitibus elongatis castaneis minute paleaceis, frondibus oblongis subcoriaceis elasticis bipinnatis facie viridibus glabris, rachibus paleaceis, pinnis lanceolatis sessilibus basalibus exceptis simpliciter

pinnatis basalibus basi furcatis, lobis linearibus integris, venis immersis occultis, indusio lato continuo brunneo persistente glabro crenulato.

Habitat.—Somali-land: Golis range, in rocky gorges at Dara-as, alt. 5000 ft., *Miss Edith Cole*, *Mrs. Lort Phillips*.

Stipes 2–5 poll. longus. *Lamina* 3–6 poll. longa, 2–3 poll. lata.

Habit of *Cheilanthes farinosa*, Kaulf. The persistent indusia meet almost edge to edge at the midrib.

CCCCLXXVI.—SHU-LANG ROOT.

(*Dioscorea rhipogonoides*, Oliver.)

Plants belonging to the monocotyledonous order *Dioscoreaceæ* consist of climbing shrubs of which the black bryony (*Tamus communis*) with an acrid tuber and red berries is a familiar example. In the tropics the typical genus is *Dioscorea* producing the fleshy tuberous roots known as yams. These are widely cultivated and form the chief food in many tropical and sub-tropical countries. In China a *Dioscorea* described below is known as a "dye yam." We are indebted to Dr. Augustine Henry, F.L.S., who has already done so much for Chinese Botany, for the following particulars:—

NOTE ON SHU-LANG.

Dioscorea rhipogonoides, Oliver, was first discovered by Mr. Ford in Hong Kong, and is described in *Hooker's Icones Plantarum, tab.* 1868. No mention is made there of its economic importance, and I believe it was not until Mr. Ford made his excursion up the Canton river that he became aware of the use of the root as a dye. The Chinese hunt for it in Hong Kong, and little of the plant is left there on that account.

In Formosa the plant occurs plentifully in the mountains; and the roots are brought to the coast, where they are much used by fishermen for dyeing and tanning their nets. I am not aware that any export occurs from Formosa.

The root (and plant as well) is known to the Chinese as *shu-lang*, and occurs in commerce as "dye-root" or "dye-yam"; while in Tonkin the French apply to it the name *faux gambier*. The Customs Trade Report for Pakhoi, 1882, says it is imported there from Annam, being a tuberous root called *shu-lang* or *faux gambier*. It is extensively used at Pakhoi in dyeing coarse native cotton cloth and fishing nets a dark brown or tan colour.

The lately opened Customs station on the Kwangsi-Annam frontier, Lungchow, is at present the seat of the trade; and the following quotations are from Customs Trade Reports on that port for the years 1889 and 1891.

"The principal article imported into Lungchow in 1889, was *shu-lang*, 3,700 piculs, value 4,437 taels (over 200 tons, 1,100*l*). It is a tuberous root growing wild in the hilly districts of Tonkin. It is now to a certain extent cultivated, but cultivation, strange to say, deteriorates the quality. It is usually gathered in spring and early summer and is sent from here down the West River to Canton, where it is used to dye cloth that peculiar reddish-black colour one so often sees in the South. The value locally ranges from $\$1\frac{1}{2}$ to $3 a picul."

"In 1891, the imports into Lungchow from Tonkin (districts of Thatke and Caobang) of *shu-lang* or *faux gambier* was 9,000 piculs, valued at 16,762 taels (over 500 tons, value 4,000*l.*)" The 1889 and 1892 Reports give some further details as to the trade.

At Canton, the root is chiefly used for dyeing grass-cloth (*i.e.*, the light fabric made from *Bœhmeria*) and the kind of silk material known as *Cantons*, both used much for summer clothing.

In the Chinese Illustrated Botany (*Chih-wu-ming*, IX., 26) *shu-lang* is figured and said to occur plentifully in the mountains of Fukien, Kwangtung, and Kwangsi provinces. Its uses are described to be for dyeing fishing nets. The Chinese author says the stem has small thorns and that the root is hairy. He is perhaps speaking of another species.

The specimens now sent are Formosan roots, and are, I think, unquestionably *Dioscorea rhipogonoides*. The leaf specimens, No. 105, were attached to the root, so that there is no doubt about these specimens.

Mr. Ford is sure that the Canton root is from the same plant. I have no specimens at present of Annamese *shu-lang*; these could be procured from Pakhoi or Canton.

Takow, 14 March 1894. AUGUSTINE HENRY.

CCCCLXXVII.—MISCELLANEOUS NOTES.

The news has reached Kew of the death at the General Hospital, Madras, on the 17th August, of Mr. ANDREW JAMIESON, Curator of the Gardens and Parks at Ootacamund, Nilgiris. Mr. Jamieson was 53 years of age, and had been connected with the Ootacamund Gardens for nearly 27 years. He was formerly a member of the gardening staff at Kew and was appointed to Ootacamund in September 1868. He was in sole charge of the gardens on the Nilgiris for many years until they were placed under the control of the present Director.

Mr. Jamieson was a skilful and capable officer and his official reports were full of valuable information. On taking over charge of the Department in 1883, Mr. M. A. Lawson, M.A., the Director, bore the following testimony to Mr. Jamieson's services:—"I wish especially to record my obligations to the Curator, Mr. Jamieson, for the loyal manner in which he has on every occasion supported me in designing the alterations I wished to introduce, and for the skill and perseverance which he has evinced in carrying out those alterations to a satisfactory conclusion."

MR. JOHN HORNE STEPHEN, formerly of Kew, and lately Curator of the Lal Bagh Botanic Gardens at Bangalore, Mysore, has been appointed Superintendent of the Public Gardens at Nagpur, Central Provinces of India, in succession to the late Mr. J. R. Ward. Mr. Ward died in January last from smallpox complicated with other maladies. He had only held his post since 1893, but had already won general regard; his untimely death has cut short a career of promise.

Botanical Magazine.—The number for August contains figures of two orchids, namely, *Saccolabium mooreanum*, from New Guinea, and *Pleurothallis Scapha*, from tropical America, but from what part is uncertain. The latter, one of the most elegant of the genus, was contributed by Mr. Moore, the Keeper of the Glasnevin Gardens, after whom the former was named. *Prochynanthes bulliana*, is the first figure published of a member of this singular genus of *Amaryllideæ*. It is a native of Mexico, whence it was introduced by Mr. William Bull, of Chelsea, who presented a plant to Kew, where it flowered last summer. *Spiræa bracteata*, a Japanese species, cultivated under various names, including *S. media*, var. *rotundifolia*, was drawn from a plant that flowered in the Arboretum last year. *S. media*, F. Schmidt, is, however, erroneously cited as a synonym. *Pyrus sikkimensis*, is an interesting species that has long been in the Arboretum, having, probably, as Sir Joseph Hooker supposes, been raised from seed sent home by him in 1849.

Herbaceous List:—A hand-list of herbaceous plants cultivated in the Royal Gardens, Kew, was issued in June last. The following account of the origin and development of the collection is given in the preface:—

The object of the present hand-list as with the rest of the series is, in the first place, to show what species are actually grown at Kew, and in the next to reduce, if possible, the nomenclature in use in gardens to something like a standard.

In the earlier Botanic Gardens the collections consisted necessarily entirely of plants grown in the open air. "Indoor cultivation" did not commence till about the middle of the seventeenth century. The greenhouse and hothouse in the Chelsea Botanic Gardens were probably amongst the earliest erected in this country.

The cultivation of herbaceous plants in the open air, or with merely winter shelter in frames, still remains one of the most important features of Botanic Garden work. Of the total number of species cultivated at Kew probably not less than a quarter are grown in this way.

The first collection of herbaceous plants at Kew was formed by William Aiton, who was engaged by the Dowager Princess of Wales to establish a botanic, or as it was then called, a physic garden. It was begun in 1760 and occupied about an acre of the southern part of the original botanic garden. The site which it occupied is immediately south of the Temple of the Sun. It was arranged on the Linnean system. According to an enumeration made by Mr. John Smith, the first curator of that name, in "Hill's Hortus Kewensis, published in 1768, the number of the Kew collection of herbaceous plants was 2712," while Aiton, "in his Hortus Kewensis, published in 1787, enumerates 2624 species."

In 1846 the Royal Kitchen Garden, "an extent of 14 acres or thereabouts," that ran parallel to the Richmond Road was abolished. Sir William Hooker states in his report for that year "several useless transverse fruit walls have been removed, and the greater portion of this area is being prepared for the reception of the entire hardy herbaceous collection; it is proposed to retain the two long (eastern and western) walls for climbing and tender plants, and new walls have been formed or are being formed with that object."

The work was carried out by the foreman, James Niven, afterwards Curator of the Botanic Garden, Hull. In 1853 a catalogue drawn up by him was printed, which enumerates 5494 names of species. These, however, include many shrubs, greenhouse plants, and ferns, as well as a large number of plants entered twice under synonymous names. A deduction of at least 1000 names must be made to arrive at the actual number of herbaceous plants cultivated at the time at Kew.

In 1867 the small rockery now devoted to hardy ferns was constructed "of Reigate sandstone," and "furnished with about 300 Alpine plants." In 1873 this was re-arranged, and in 1874 "about 560 species of Alpine plants were grown upon it."

This was, however, regarded as a very inadequate representation of a branch of horticulture which had become very popular, and in 1881 a memorial was addressed to Her Majesty's Office of Works in which "the formation of a rock garden on a sufficiently important scale" was warmly urged. The matter was under consideration when it was "brought to an issue by the gift on the part of the executors of the late George Curling Joad, Esq., F.L.S., of Oakfield, Wimbledon Park, in accordance with the wishes expressed by him before his death, of the entire collection of herbaceous plants cultivated at Oakfield."

A sum of 500*l.* was granted by the Treasury for the formation of the present rock garden which was constructed on the vacant piece of ground adjacent to the herbaceous ground. Part of the rock used was weathered oolite obtained from Bath: part weathered mountain limestone from the Cheddar Cliffs. For the rest use was made of the materials of "an overgrown and neglected rockery (Stonehouse Ruins) dating from the time of George III.," in the Arboretum, south of the Temperate House.

Mr. Joad's collection of plants amounted to 2630 specimens, and had been got together at great pains and expense. It pretty well furnished the new rock garden: it has since been continuously added to.

A rock garden is, however, unsuitable for the cultivation of Alpine plants from the higher levels. To these the dampness of an English winter in the open air is in the vast majority of cases fatal. Again, in an English spring the plants flower too early and suffer severely from its harshness. They can only be successfully wintered in frames, which take the place of their natural covering of snow. The extensive collection is maintained under these conditions at Kew, and when in flower shown in the Alpine House adjoining Museum No. II. This, which is unheated, was erected in 1887 and enlarged in 1892.

For continuous aid in the increase and maintenance of the collection of Alpine plants Kew is greatly indebted to G. C. Churchill, Esq., who for several years has conducted an assiduous correspondence on its behalf with collectors in all parts of Europe.

The tank for aquatic plants immediately in front of the Jodrell Laboratory was constructed in 1873.

The wild garden adjoining the Cumberland Gate was planted in 1882.

Mention must be made of the Kew collection of bulbs. These, though largely used to produce a decorative effect in the spring, are in great measure of botanical interest. They have for the most part been grown at Kew since 1886 from a small original stock by the same methods as are employed in Holland. At the beginning of summer they are lifted, harvested, and planted out again the following autumn.

The collection of crocuses is mainly the gift of George Maw, Esq., F.L.S.

For constant and liberal contributions of bulbs of all kinds Kew is indebted to Edward Whittall, Esq., of Smyrna.

The collection of herbaceous plants is intended for inspection and it is not permitted to gather specimens. To meet the special wants of students a limited collection, where this restriction is not enforced, was made in 1880 on the ground adjoining the Herbarium. Admission to this "Students' Garden" may during the summer months be obtained on application at the Curator's office on Kew Green.

The total number of herbaceous flowering plants now in cultivation at Kew is approximately 6000, including 1000 well marked varieties.

Since 1885 lists of seeds available for exchange with other botanical establishments have been issued annually.

British Fungus-Flora.—The fourth volume of Mr. G. Massee's new Fungus-Flora has appeared. In this volume the three families *Gymnoascaceæ*, *Hysteriaceæ*, and *Discomycetes* are reviewed, and illustrated by upwards of 300 figures. Altogether 113 genera and 702 species are described and classified, as follows: *Gymnoascaceæ*, 3 genera and 10 species; *Hysteriaceæ*, 13 genera and 32 species; and *Ascomycetes*, 97 genera and 660 species. The genera *Ostreion* and *Masseea*, previously only recorded from America, have been added to the British list.

Pay of Employés.—On the recommendation of the First Commissioner of Her Majesty's Works and Public Buildings, the Treasury has agreed to the minimum wage at Kew being raised to 21*s*. In addition to this both labourers and gardeners receive gratuitous medical attendance during sickness, sick pay according to length of service and extra pay when employed on Sundays. On the other hand retirement at 60 is compulsory, and pensions in the shape of "compassionate allowances" are abolished by the Superannuation Act, 1887, which only allows a gratuity of one week's pay for each year of service.

It will be interesting to trace the gradual rise of wages at Kew since 1841, when it became a national establishment.

YEAR.	LABOURERS.	GARDENERS.
	s.	*s.*
1841	12	12
1847	14	—
1865	15	14
1873	17	16
1885	—	18
1889	18–20	—
1894	19–20	—
1895	21	21

South Wing of Temperate House.—The erection of this was sanctioned by the Treasury last year (*Kew Bulletin*, p. 398). The care required in the preparation of the detailed working drawings and the securing the necessary contracts as soon as the supplementary estimate had been passed by the House of Commons, prevented the work being immediately taken in hand. The contractor, however, commenced work on the site on August 19, and building is being pushed on with all possible speed. It is hoped that the new wing will be completed by the middle of next year.

Wire Fence.—The removal, by the gracious permission of Her Majesty the Queen, of the fences excluding the public from the Palace Meadow was announced in the *Kew Bulletin* for March (p. 75). Since then the First Commissioner of Her Majesty's Works and Public Buildings has authorised the removal of the wire fence which since 1844 has separated the Botanic Garden from the Arboretum. As for many years there has been no difference in the administration of the two areas, which are equally devoted to botanical purposes, the fence had become devoid of any practical object. And the four gates, by which alone it could be passed, had become wholly inadequate to the convenient movement of the large crowds which now frequent the Royal Gardens in fine weather.

Injury by Lightning.—The Royal Gardens have long enjoyed an immunity from the effects of lightning, thunder storms rarely passing over them. Unfortunately this can no longer be said to be the case. On the night of Saturday, August 10, a Deodar, 45 ft. high, the most graceful and symmetrical which Kew possessed, growing between the Palm House and the Pagoda Vista, was completely destroyed. This was the more remarkable, as though standing alone it was in the neighbourhood of higher trees. The top of the tree for 17 feet was apparently uninjured, though severed from the trunk as if by the blow of an axe. The rest of the trunk below this was shivered into fragments.

On August 22 following the top of the Water Tower was struck, and sustained serious damage.

In 1889 the Herbarium and flag-staff were provided with the best appliances for protection from lightning, under the direction of W. H. Preece, Esq., C.B., F.R.S. And in 1894 these were also furnished to Museum No. I.

International Geographical Congress.—At the request of the executive the Director of the Royal Gardens received the foreign and the leading English members of the Congress at the Royal Gardens on August 1st. Of the former about 600 were present, two special trains having been provided for their conveyance from London. By the gracious permission of Her Majesty the Queen, the reception took place at Kew Palace. The foreign members were afterwards taken over the establishment in parties by different members of the staff.

Portrait of Dr. Thomas Thomson.—Sir Joseph D. Hooker has presented Kew with a replica of a portrait of the late Dr. T. Thomson, F.R.S., by G. Richmond, R.A. The portrait was painted in 1852, when Thomson was 35 years of age, and the replica was done at Richmond's house, under his eye, if not actually by himself. Dr. T. Thomson was a son of the celebrated chemist of the same name, and began his active career in the medical service of the Honourable East India Company. In 1847 he was selected to accompany the mission to Tibet, and he was the first botanist to enter the Karakoram mountains. His narrative of the journey was an important contribution to many branches of science. Subsequently he joined Dr. J. D. Hooker, and they botanised together in the Khasia mountains, and on their return to England in 1850, he assisted at Kew in naming and distributing the botanical collections, and in writing the first volume of the *Flora Indica.* He afterwards was appointed director of the Calcutta Botanic Garden, an appointment he held only a few years, returning to England in 1860 in bad health, from which he never recovered, though he lingered on until 1878.

Handbook of the Flora of Ceylon.—The third volume, or third part, as it is designated, of this admirable work has just appeared. It contains the orders *Valerianaceæ* to *Balanophoraceæ.* With it are issued plates 51 to 75. These are of quarto size, and represent interesting or critical species. Dr. Trimen, who is now on leave in this country, is to be congratulated on the rapid progress of his undertaking. For further particulars see *Kew Bulletin*, 1894, p. 34 and p. 227.

Cultivation of Plantains in British Guiana.—In the report on the agricultural work in the Botanical Gardens at Georgetown for the year 1890, it is stated that "plantains being the staple food of the creole population, the cultivation is a firmly established minor industry," those who follow it being called "farmers" as distinct from "planters" who cultivate the suger-cane. Plantains are said to "delight in the stiff newly empoldered clay lands of the colony, not objecting to the slightly saline element found where the sea or river has invaded the place periodically at spring tides . . . . Such lands yield heavily but "the crop is liable to suffer, if the seasons prove very wet, from the plantain disease of the Colony." From the report in the Blue Book for 1893–4 published in the *Colonial Reports* No. 133, British Guiana, p. 13, it appears that the cultivation is dying out.

"The cultivation of plantains on sugar estates becomes less year by year, and there are now only 1917 acres in plantains, and although many plantain farms of which there is no official record still exist, this vegetable has practically ceased, from its comparitive scarcity, to be the staple food of the African population."

This change cannot fail to prove detrimental to the interests of the Colony. More money will necessarily have to be spent on imported rice and flour, while valuable lands will be left uncultivated capable of yielding large crops of food.

Piper ovatum.—At the request of Kew the leaves and other parts of this plant have recently been the subject of investigation at the Research Laboratory of the Pharmaceutical Society by Professor W. R. Dunstan, F.R.S., and Mr. Henry Garnett. The material was received from Mr. J. H. Hart, F.L.S., Superintendent of the Royal Botanic Gardens, Trinidad.

Piper ovatum, Vahl. (Ottonia Vahlii, *Kth.*) is a herbaceous shrub about 2–4 feet high with large papery leaves. It is found rather abundantly in woods in the central parts of Trinidad and is employed locally as a remedy for snake bite and hydrophobia. When chewed it gives rise to a persistent tingling of the tongue and lips which is followed by a sensation of numbness accompanied by profuse salivation; in these respects resembling pellitory. All parts of the plant, leaves stem and root, possess this property, but the leaves and root appear to act more powerfully than the stem; the leaves have an aromatic taste due to an essential oil which is absent from the root.

The following results are taken from a paper contributed by the investigators to the *Transactions of the Chemical Society*, 1895, pp. 94–100. A small quantity of an almost colourless, volatile, aromatic oil was obtained by distillation from the leaves. This was optically inactive, since a 6 per cent. solution in alcohol produced no rotation of the polarised ray. Without analysis the volatile oil of *Piper ovatum* was regarded as a sesquiterpene. Of the non-volatile constituents the active principle, called *Piperovatine*, forms colourless, light needles, which often crystallise in rosettes. In appearance these somewhat resemble the alkaloid caffeine. In strong alcohol the highly purified substance has the curious property of apparently gelatinising when water is added to it in just sufficient quantity to cause precipitation. Further investigations will probably show that the constitution of piperovatine is precisely similar to that of such alkaloids as piperine, atropine, and aconitine. As regards its physiological action according to Professor Cash, F.R.S., of Aberdeen, it acts as a temporary depressant of both motor and sensory nerve fibres and also of sensory nerve terminations producing local anæsthesia. The authors sum up the results, so far obtained, in the following words:—"In attempting to utilise the local anæsthetic effect of piperovatine the want of penetrating power, the temporary character of its action, and, above all, its property of causing salivation, have interfered with its successful employment in the minor operations of dentistry. The solution of piperovatine in almond oil has, however, given promising results in affording temporary relief in painful superficial lesions." It is added that there is a strong resemblance between the physiological action of piperovatine and that of the root of pellitory.

Preservation of Books in the Tropics:—In the *Kew Bulletin*, 1894, pp. 217, 218, an extract was given from *India Museum Notes*, Vol. iii. No. 3, on the best means for preserving books from the ravages of insects in the tropics. On this subject the following letter has been received from Surgeon-General George Bidie, C.I.E., formerly in charge of the Government Central Museum, Madras:—

Berry View, Paignton, South Devon,
19th March 1895.

SIR,

IN the *Kew Bulletin* for 1894, p. 217, there is a memorandum on the "Preservation of Books in the Tropics," and I now write to mention that so far as their protection from insect enemies is concerned, the subject was investigated by me years ago, when in charge of the Government Central Museum, Madras, and the practical outcome of the experiments recorded in the Museum Annual Reports for 1881 (p. 6) and for 1883 (p. 4). Indeed, it may be affirmed that the application of corrosive sublimate for the protection of books from tropical insects was first devised by the staff of the Madras Museum, and thereafter regularly used for the books in the scientific and large public libraries which it contains. Before bringing it into use it was carefully tested by placing books and papers poisoned with it in the nests of white ants, the most formidable of all the enemies of literature, and it was invariably found that the articles thus exposed came out of the ordeal uninjured. The composition of the Madras preservative was as follows:—

Corrosive sublimate - - - -	1 oz.
Carbolic acid (Calvert's) - - -	1 oz.
(or Thymol, ¼ oz.)	
Methylated spirits - - - -	2 pints.

This mixture was carefully and freely applied with a soft brush about the bindings and amongst the leaves of the books, the eyes of the operator being protected with close fitting goggles. It dried quickly and was perfectly safe, as I have never seen or experienced any disagreeable effects from handling books poisoned with it.

My impression is that the value of this preservative was made known to all public departments by Government circulars, but apparently these never penetrated so far as Calcutta.

I am, &c.,
(Signed) G. BIDIE.

W. T. Thiselton Dyer, Esq., C.M.G., &c.,
Director, Royal Gardens, Kew.

Gum Tragacanth.—In a Foreign Office Report (No. 1624, Annual Series, 1895) on the agricultural condition of the Vilayet of Angora, Turkey, the following account is given by Consul Cumberbatch of "Kitré" or gum tragacanth, a partially soluble gum obtained from species of *Astragalus*.—"It is known in commerce as fine white 'Syrian' tragacanth, and appears as 'leaf-sorts' and 'vermicelli.' It has the appearance of twisted ribbons, is white and reddish, nearly opaque, and a little ductile. Its adaptability in lieu of borax for giving lustre to starched linen is perhaps not generally known. The districts where the shrub is chiefly found are Yozgat, Iskilip, Cesarea, Kaledjik, and Angora. Like the yellow berry (the fruit of *Rhamnus infectorius* described in the Museum Guide, I., p. 36) this plant is also neglected owing to the falling-off in the foreign demand, and though abundant in the above-mentioned districts little or no trouble is taken by the peasants to collect the gum; this is done by men specially sent from other parts. It is found growing wild in the fields, on the road sides, and even in hilly parts. On account of its prickly nature animals avoid it, but it is frequently gathered for fuel by the peasantry."

Particulars of gum tragacanth may be found in Museum Guide, I., pp. 45, 46. The gum is not simply the juice of the plant hardened by exposure, "but a more or less complete transformation of the cells of the pith and medullary rays of the stem into a mucilaginous mass." Good botanical specimens of tragacanth-yielding species, with information on the mode of collecting the gum, are much wanted at Kew.

Zinc in dried Apples.—In a recent Consular Report furnished to the Government of the United States, it is stated that "for a number of years dried apples in the form of slices, pieces, or rings, have been imported into Germany from the United States, and it has been observed that this fruit often contains zinc in such quantities that, according to medical authority, the consumption of it may be detrimental to health. The German authorities have, in consequence, endeavoured by every possible means to prevent the importation of American dried fruits containing zinc and to bring about the judicial punishment of the vendors of such merchandise." It is shown that the zinc gets into the apples during the drying process and is due to the use of zinc plates or trays in the fruit evaporators, the acid of the apples chemically combining with the zinc forming a malate of zinc. The use of zinc plates is said to give the dried apples a fine light colour, but as stated in the report "it would not seem to be advisable to employ such means for the sake of a comparatively small and purely external advantage." In place of zinc plates it is recommended that racks or frames of wood be used, or that the apple-slices be dried upon strings or cords. These methods "are often employed in Germany, and therefore the brownish colour of the products obtained through them would not put them to any disadvantage so far as their importation into Germany is concerned."

White Willow.—The Huntingdon or White Willow (*Salix alba*, L.), so called from the silky whiteness of the underside of the leaf, is a native of Britain and extends to Europe, North Africa, North-west India and Western Asia. It grows rapidly and attains a large size. Exceptional trees are described as "80 feet high with a trunk 20 feet in girth." The leaves are narrowly lanceolate, silky on both sides when young. The catkins appear with the leaves and are slender and lax. The bark is used for tanning and it yields the medicine salicine. The timber is valuable for a variety of purposes such as turnery, mill work, coopering, and cricket bats. The charcoal is excellent for the manufacture of gunpowder and for crayons,

The favourite localities for the growth of the White Willow "are low shelving banks of streams and rivers, riverine tracts subject to occasional inundation with water holding rich mud and silt in solution, and fresh or damp meadow land whose soil moisture is not stagnant." It grows also in uplands not subject to inundations, and is occasionally planted as an ornamental tree in woods. It is extensively planted as a pollard tree, but in this case it is not so valuable for timber purposes. The demand for good white willow suitable for bat-making appears to be increasing, while the supply is falling off. Several inquiries have been made at Kew on the subject. Recently a letter was received from Mr. A. Dye, a cricket-bat maker of Sydney, New South Wales. He states "I have experienced great difficulty in obtaining the particular kind of Willow required in my business, viz., *Salix alba* . . . I have repeatedly ordered white willow from various firms in England and have never yet received the right stuff. I now feel certain they do not know where to obtain it."

A firm of timber merchants in the City writes: "We have made several inquiries, but find that the demand for white willow is so great that there is considerable difficulty in procuring any, the large bat makers having always men scouring the country trying to pick up what they can. One man, however, has been in to-day to offer us some. The price would be *5s.* per cubic foot where the wood lies. It seems a very long price, but most of our friends tell us we should not be able to get any at all."

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 106.] OCTOBER. [1895.

CCCCLXXVIII.—NEW RUBBER INDUSTRY IN LAGOS.

(*Kickxia africana*, Benth.).

(WITH PLATE.)

In the *Kew Bulletin*, 1888, pp. 253–261, there is an account of rubber extracted at Lagos from the "Abba" tree (*Ficus Vogelii*, Miq.). A further account is given in the *Bulletin*, 1890, pp. 89–93. This rubber, although promising, "could not be used by itself," and attention has since been devoted to other sources of supply. In West Africa it is well known there are numerous plants yielding commercial rubber. The chief of these are species of the Apocynaceous genus *Landolphia*, consisting of climbing shrubs, with stems 4 to 6 inches in diameter dividing above into numerous branches, and supporting themselves on neighbouring trees. From these, and similar plants, a very important rubber industry was started at the Gold Coast by Sir Alfred Moloney, K.C.M.G., in 1882; and although previous to that year no rubber whatever was exported from that colony, it had attained in 1893 to the annual value of 200,000*l*. This is a remarkable and striking instance of the creation of a new industry by official action, and it deserves to be recorded. In 1882 Sir Alfred Moloney addressed a letter to the "Lagos Times" (*Forestry of West Africa*, pp. 83–88) strongly recommending attention to the possibilities of a similar rubber industry in Lagos, and suggesting "the adoption of measures having for their object the addition of one more to the industries of the colony." The result of this was not immediately apparent. But in 1894 the present Governor of Lagos, Sir Gilbert T. Carter, K.C.M.G., issued the following notice, as appears from the *Report* on the Botanic Station for the quarter ending the 30th June 1895:—

"His Excellency, the Governor, desires to notify to the mercantile community of Lagos that he has been able to induce a party of natives from the Gold Coast experienced in rubber collecting to come to Lagos, with a view to the development of this valuable and important industry. The men have already inspected certain districts, which they report to be rich in rubber-producing plants, and it is confidently hoped that

Lagos will shortly be able to compete with the sister colony of the Gold Coast in the great export of the product."

Following this came the announcement that a new rubber-yielding plant had been discovered in the colony of Lagos, and that it was a large tree abundantly distributed in the interior forests.

In the report on the Botanic Station at Lagos for the quarter ending 31st December 1894 the Curator states: The rubber industry of the colony is rapidly extending. Large quantities are collected around Jubi Ode. There is no doubt that the rubber supply of West Africa is not confined to species of *Landolphia* and *Ficus*. A large tree, probably belonging to the *Apocynaceæ*, found abundantly in the interior lands, also yields rubber. Mr. Leigh, one of the assistants at the station, was away above a week collecting specimens of this rubber. When ready they will be submitted to the authorities at Kew for a report. The native name of the tree is "Ire." Mr. Millen adds, "It may prove very valuable to the colony."

In April 1895, Captain Denton, C.M.G., the Acting-Governor, communicated some specimens to Kew with the following remarks:—

"I send you by parcel post some specimens of the tree—native name Irai—from which the rubber which is sent from this part of the world is obtained. During the last six months it has become a valuable article of export, and there appears to be every chance of the quantity produced increasing. I obtained these specimens from the district between Ilogbero and Ilaso, where I saw the process of procuring the juice from the tree in course of progress. The Irai tree, at the base, is between 3 and 4 feet in circumference, and is some 30 to 40 feet high. The natives score the bark to a depth of five-eighths of an inch, and the men, who have had experience of the work in other places, contend that the tree can be tapped again with good results in about 18 months' time. If this is so, we have started what is likely to prove a valuable industry."

So far it had not been possible to identify this new rubber-yielding tree. The specimens hitherto received at Kew were imperfect, and in some cases even consisted of portions of totally different plants. The next contribution received was from Mr. Jonathan C. Olubi, F.R.G.S., who forwarded excellent specimens of the tree and samples of the rubber, accompanying them with the following interesting letter:—

Mamu Forest Station, Ibadan District,
Lagos, May 3, 1895.

DEAR SIR,

FOR identification, improvement on, and advice about the rubber tree discovered in this forest not quite a year ago by the energy of Governor Carter, I now send you the following parcels.

I have seen many foreign rubber trees and vines in the Botanic Station at Lagos such as the Kosa rubber, Para rubber and the *Ficus elastica*, but not this particular tree that I am going to describe. It was first discovered in Accra about the year 1883 and from its resources many Europeans and natives have made their fortunes. The native name of this rubber tree is Ire, Ireh, or Ereh.

The Ire tree is one of the most beautiful trees in the forest. From the ground it grows evenly in bulk and smoothly to the height of 60 to 70 feet. The average thickness of the tree is 12 to 14 inches in diameter. In the rainy season, when the trees are full of milk, a tree well tapped is capable of producing from 10 to 15 lbs. of rubber, which is worth about 1*s*. per lb. here if properly prepared, and 2*s*. 1*d*. to 2*s*. 4*d*. in English markets if made into biscuit.

The present method by which the milk is extracted is shown on the piece of stick enclosed, and this is said to be the most perfect way known to the natives. I have heard of an instrument by which one can easily extract the milk; can you give any help or direct me to where I can get a sample? There are many ways in which the milk is prepared: first by cutting a coffin-like hole in the trunk of a tree and throwing in milk daily until it is full, then the milk is well covered, airtight if possible, and within a month it is quite solid. Of course in the rainy season it may take two months before it is solid. This is known as the silk rubber.

The one gathered and cooked in water and whose appearance shows white after cooking (although the atmospheric influence causes it to get black after some days of exposure) is known as the first quality rubber. The rubber cooked as gathered and thickened by heat directly in the pot obtains varied prices. Can one improve on these methods? I know of one method, but it is difficult to follow, for one cannot get the fresh milk. The custom is to purchase already cooked milk. The preparation I speak of is to allow the milk to remain in cold water (about double the proportion of the milk) for twenty-four hours, then the milk floats. This is then gathered and put in a bag, which can be hung up for perfect draining or the bag put in a box with so many holes for the water to escape. This fetches a good, and, I dare say, the best value; but unless one can command his own forest the fresh milk is hard to get. The sample of rubber sent is of the general preparation cooked as brought from the tree. If desirable I shall send you a two feet long log of the rubber tree. For any name appropriate for the tree and any improvement on the preparation of the rubber, also for collecting the same, I shall thank you very much.

I remain, &c.
(Signed) J. C. OLUBI.

The Director,
Royal Gardens, Kew.

THE RUBBER PLANT.

The specimens sent by Mr. Olubi led to the identification of the new rubber plant as *Kickxia africana*, Benth. Of this plant we had very little previous information.

In May 1888, a sample of seeds marked "India-rubber seeds" from Winnebah, Gold Coast, West Africa, was forwarded to Kew by Messrs. J. Bowden & Co., Liverpool. The seeds were stated to be worth 72*s.* per lb. There was, however, no further reference made to the plant yielding them as a source of India-rubber. The seeds were determined as those of *Kickxia africana*, Benth., a tree of the order *Apocynaceæ*, known to occur in West Africa, from Sierra Leone to the delta of the Niger, and in the island of Fernando Po. As the seeds were then in commerce as a substitute for *Strophanthus* seeds, it was inferred that the high price they fetched was due to this and not to their value as a means of propagating India-rubber plants. In fact, it seems that they were never suspected to have any other importance than that they lent themselves readily for the adulteration of *Strophanthus* seeds. Thus Mr. E. M. Holmes,[1] Mr. T. Christy,[2] Dr. J. Nevinny,[3] and lately Mr. L. Planchon[4] examined the seeds of *Kickxia africana* from this point of view, and they pointed out the characters in which they differed from the seeds of *Strophanthus*.

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[1] Notes on false Strophanthus seed, in *Pharm. Journ.* Vol. XVII (1887) 903, 904.

[2] New Commercial Plants and Drugs, (1887), No. 10, p. 11, and fig. 7 on p. 10.

[3] Kickxia and Strophanthus, in Z. öst. Apoth. 1887, Nos. 20, 21, 22.

[4] Produits fournis à la matière médicale par la famille des Apocynées (1894) pp. 80, 81.

From Mr. Olubi's letter quoted above it would appear that the tree was known in Accra as early as 1883 as a rubber tree, and this evidently accounts for the sample of seeds sent by Messrs. Bowden & Co., to Kew, in 1888, being called India-rubber seeds.

The vernacular name of the tree is spelt Ire, Iré, Irai, Ireh, and Ereh. A similar name "Ere" occurs in Moloney's List of Timbers in *Forestry of West Africa*, p. 207, No. 6. It is there applied to a tree 25-33 feet high and 4 feet in diameter, but no further particulars are given.

The description of *Kickxia africana* drawn up by Bentham for Hooker's *Icones Plantarum* (t. 1276) was based upon rather scanty material. Dr. Stapf who is engaged in the elaboration of the *Apocynaceæ* for the *Flora of Tropical Africa*, has therefore prepared a more complete description from the fuller material now available.

Kickxia africana, Benth. in *Hook. Ic. plant.* t. 1276 (1877–79). A large glabrous tree, 50–60 feet high with terete branchlets which turn black in drying. Leaves 4–9 in. long, 1½–3 in. broad, oblong, shortly acuminate at both ends, coriaceous, with 8–10 nerves on each side and inconspicuous veins, petiole 2–6 lin. long. Flowers in shortly peduncled, bracteate, often many flowered and much contracted cymes, originally terminal but afterwards apparently axillary, being overtopped by a branch from the axil of one of the uppermost leaves; peduncle short, to 3 lin. long; bracts small, ovate, acute; pedicels to 2 lin. long. Calyx about 1¾ lin. long, 5-partite, segments ovate, with several glands at the base. Corolla salver-shaped, yellow, tube fleshy, constricted at or just below the middle, 3 lin. long; lobes 5–6 lin. long, oblong, overlapping to the right, nearly erect in bud, then spreading. Stamens 5, inserted above the constriction of the tube and enclosed in it, filaments short and broad having a gibbous swelling on the back; anthers conniving in a cone around the stigma, to which they adhere by a glutinous secretion from the base of the anther cells, sagittate, acuminate, tipped with a few minute hairs, basal tails solid, destitute of pollen. Disc fleshy, of 5 free or more or less comate lobes closely surrounding the ovary to ⅗ of its height. Ovary of 2 free minutely hairy carpels; style filiform; stigma capitate, slightly grooved, constricted into a broad, conical apex; ovules pendulous, numerous in each cell. Follicles about 4–6 in. long, spreading, thick, spindle-shaped, with two sharp longitudinal ridges, woody. Seeds 6–7 lin. long, spindle-shaped, compressed, brown, with a long basal awn (pointing towards the base of the follicle), and a fine point on the other end; awn naked at the base, otherwise covered with long reversed silky hairs; albumen forming a thin or rather thick coat around the embryo; cotyledons contortuplicate and much longer than the superior radicle.

The laticiferous vessels are found in great numbers in the inner bark within a zone of hardened tissue and accompanied by cells containing crystals.

The habitat of *Kickxia africana* was stated in the *Icones* to be "West Tropical Africa, Bagroo River, and Fernando Po, Mann No. 817, Bonny, Kalbreyer." It is evident that it has a very wide distribution, extending from Sierra Leone to the Gold Coast and beyond the mouths of the Niger to the Bight of Biafra. How far it may extend inland it is impossible to say.

In September last Kew received from Captain Denton, C.M.G., two pieces of the trunk of the Lagos rubber tree, each about 10 inches to a foot in diameter, scored with the marks of the rubber gatherers. These will be placed in the Kew museums. They were sent as the "female" rubber tree, a name we learn that is locally applied to the *Kickxia africana*, Benth. It is thus distinguished from *Holarrhena africana*, quite a different plant, which is fancifully called the "male" rubber tree. The latter is a Rubiaceous plant not known to yield any rubber.

As showing the remarkable development which has taken place in the rubber industry at Lagos during the last six months, the Acting Governor has furnished Kew with the following particulars:—

Return of Rubber exported from Lagos during the half year ended June 30, 1895.

Month.	Weight.	Value.
	lbs.	£ s. d.
January - - - - -	21,131	1,213 10 3
February - - - -	15,388	777 0 11
March - - - - -	26,316	1,419 7 8
April - - - -	39,763	2,078 16 6
May - - - - -	216,916	11,700 0 7
June - - - -	268,619	12,577 2 6
Total - - -	588,633	29,765 18 5

E. A. Lovell, Collector of Customs.

July 12, 1895.

EXTRACTING THE RUBBER.

The following information respecting the mode of tapping the Ire trees and preparing the rubber is taken from the *Report* of the Botanic Station at Lagos for the quarter ended 31st March 1895. This Report was prepared during the absence of Mr. Millen on leave by Mr. F. G. R. Leigh, the acting-curator.

In tapping the trees the bark is first cut in a vertical direction from the bottom to the top. This single line is about ½ to ⅝ of an inch broad, and deep enough to reach the inner bark. This forms the main groove. On each side of this two series of oblique grooves, about two feet apart, are cut, each running into the main groove. The side grooves are made, beginning at the top, and gradually reaching the base of the tree. All the milk exuding from the lateral grooves will find its way into the main groove and so ultimately reach the bottom, where a vessel is placed to receive it. When sufficient milk has accumulated it is then collected and made into rubber.

The methods adopted for coagulating the milk are then described. These are at present of two kinds, viz.: "the cold process" and "the heat process." The cold process is chiefly practised by the Fanti men introduced from the Gold Coast. A cavity is excavated in the trunk of a fallen tree so as to form a cistern of the capacity necessary for holding the milk collected during several days. Into this the rubber gatherers pour the milk, after straining it, from day to day until it is quite full. It is then covered with palm leaves and left for 12 to 14 days and sometimes much longer, depending on the season, until most of the watery portions have either evaporated or sunk into the wood. After being kneaded and pressed together the rubber thus obtained has a dark brownish colour, with the inner portions of a slightly lighter colour. Such rubber is known locally as "silk rubber."

The local price is from 10*d.* to 1*s.* 2*d.* per pound.

The heat process is the one generally adopted by the natives of Lagos. This is much simpler in working, as it disposes of all the milk collected at the close of each day. After being strained the milk is placed in a vessel and boiled. The rubber begins to coagulate almost directly the heat is applied, and after the boiling is over is removed in a somewhat sticky condition, owing to being burnt, and of a blackish colour. The local price of this rubber is from 9*d.* to 1*s.* per pound. It is pointed out that the heat process, though simpler, impairs the quality of the rubber, and is calculated to injure the industry. It is probable that if the heat process were somewhat modified the results would not be so injurious. An experiment was tried at the Botanic Station to coagulate the milk by heat, but not applied directly to it. The result was much more satisfactory. The rubber came off of a milky white colour, and after being pressed it was clean and firm without being sticky. A sample of this received at Kew was reported upon by Messrs. Hecht, Lewis, and Kahn. It is the sample referred to below as No. 2.

Messrs. HECHT, LEVIS, and KAHN to ROYAL GARDENS, KEW.

21, Mincing Lane, London, E.C.,
September 13, 1895.

DEAR SIR,

WE have your yesterday's lines, and also two samples of Lagos rubber.

We have had, both in Liverpool and in Hamburg, for the last six months, large imports of rubber from Lagos, and this description seems to have been favourably received by consumers.

Your sample No. 2 is of very fine quality, and would be worth, if sent in the same clean and dry condition, from 2*s.* 3*d.* to 2*s.* 4*d.* per lb. Your sample No. 3 is also good, but less close in texture and much damper, which seriously detracts from its value. Still, the rubber is cleaner than the average arrivals from Lagos, and to-day's value would be about 1*s.* 5*d.* to 1*s.* 6*d.* per lb.

From what we hear the production of rubber in Lagos is likely to increase largely, and we only hope that the producers will keep the rubber as clean and free from impurities as possible.

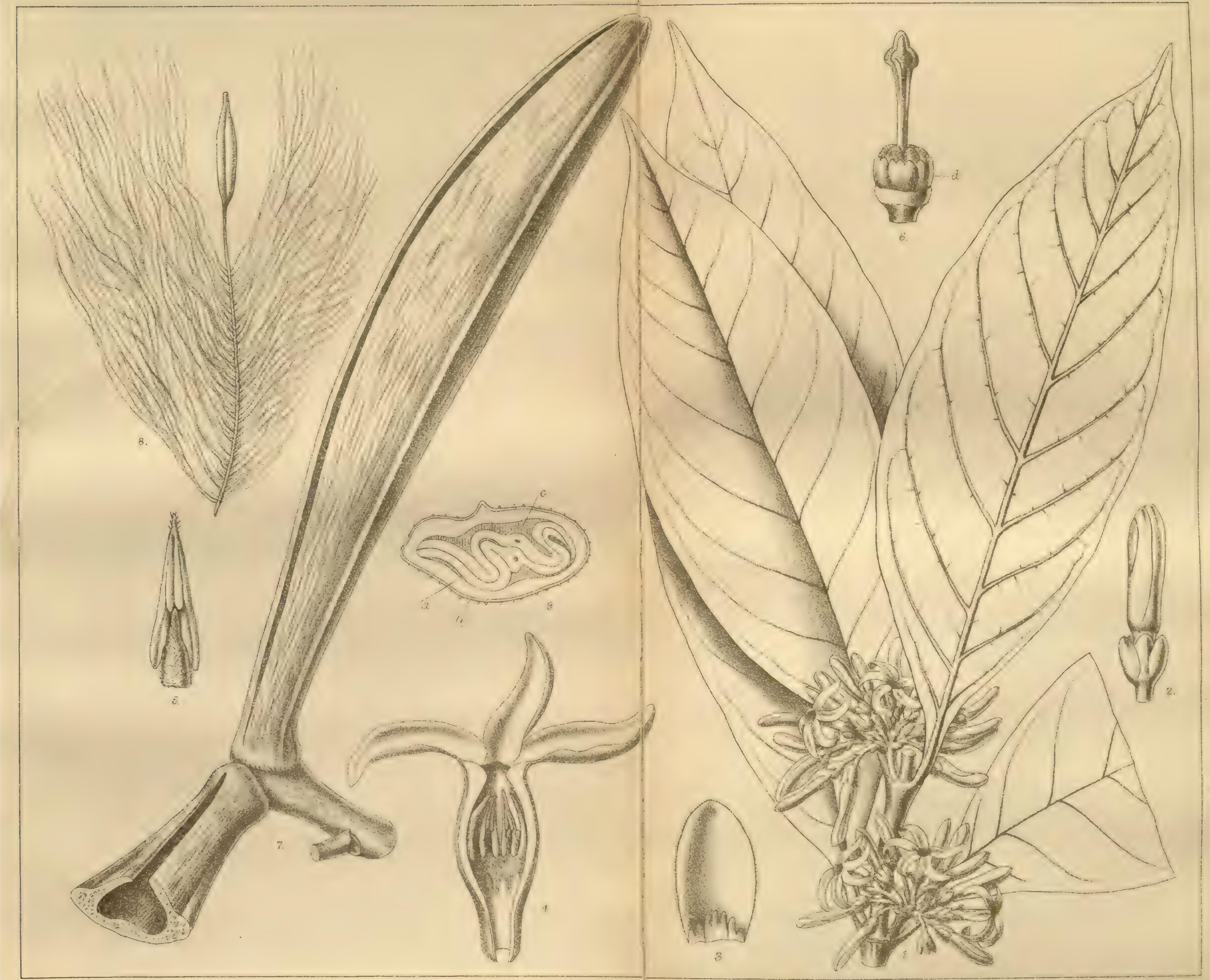
Always at your service,

We remain, &c.
(Signed) HECHT, LEVIS, & KAHN.

John R. Jackson, Esq.,
Royal Gardens, Kew.

The history of this new rubber industry in Lagos is full of interest, and illustrates the wonderfully rich resources of the vast forests of West Africa. It shows also very clearly how largely these resources can be developed by judicious and intelligent action on the part of the Government.

Should the new *Kickxia* rubber continue of commercial value, there is no doubt that it will eventually be possible to establish regular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M. Smith del,

Vincent Brooks, Day & Son lith

Kickxia africana, Benth.

plantations, and thus make the industry a permanent one. It has always been seen that owing to the climbing habit of the species of *Landolphia* which have hitherto yielded African rubber, it was not practicable to cultivate them in regular plantations as they required the support of other plants, and when once tapped many years would have to elapse before they would be fit to yield another crop. With the *Kickxia* these practical difficulties disappear.

The important position now occupied by the rubber industry in British Possessions in West Africa may be gathered from the following table compiled from the Supplement to the *India Rubber Journal* of August 12, 1895:—

RETURN of RAW CAOUTCHOUC received in the UNITED KINGDOM from BRITISH WEST AFRICA, including the GOLD COAST and LAGOS.

Year.	Weight.	Value.	Average price per Cwt.
	Cwts.	£	s.
1890	33,876	297,453	175
1891	48,164	408,646	169
1892	41,967	357,133	170
1893	54,357	452,799	166
1894	47,466	393,990	166
Total	225,830	1,910,021	169

EXPLANATION OF PLATE.

1. Flowering branch (natural size). 2. Bud. 3. Segment of calyx with glands at the base. 4. Corolla, cut open with style and stigma removed. 5. Anther, front view. 6. Pistil with disk (*d*). 7. A pair of follicles (natural size). 8. Seed. 9. Transverse section of seed (*t.* testa, *a.* albumen, *c.* cavity). Nos. 2 to 6 and 8 and 9 all enlarged.

CCCCLXXIX.—DIAGNOSES AFRICANÆ, VIII.

(*Continued from p.* 230.)

ASCLEPIADEÆ.

Auctore, N. E. Brown.

326. **Tacazzia conferta**, *N. E. Brown;* caule puberulo, foliis oblongis vel oblongo-lanceolatis acuminatis utrinque glabris, paniculis corymbiformibus subsessilibus vel breviter pedunculatis, floribus ad apices ramulorum umbellatis, sepalis late ovatis obtusis vel subacutis ciliolatis, corollæ lobis late oblongis obtusis emarginatis, coronæ lobis filiformibus apice tortuosis.

Habitat.—Abyssinia: Efat, *Roth*, 407.

Foliorum petioli ½ poll. longi, laminæ 2½–4 poll. longæ, 1–1½ poll. latæ. *Pedicelli* 2–3 lin. longi. *Sepala* ¾–1 lin. longa. *Corollæ lobi* 2–2½ lin. longi.

327. **Tacazzia nigritana**, *N. E. Brown;* caule glabro, foliis oblongis versus apicem cuspidato-acutum leviter angustatis supra glabris subtus pubescentibus, paniculis pedunculatis glabris, sepalis late ovatis subacutis glabris, corolla glabra, coronæ lobis filiformibus erectis.

Habitat.—Niger territory: Aboh, *Barter*, 486.

Foliorum petioli ¾ lin. longi, laminæ 2½–3 poll. longæ, 10–13 lin. latæ. *Paniculæ* 2 poll. longæ. *Pedunculi* 6–9 lin. longi. *Pedicelli* 2–3½ lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* 2–2½ lin. longi.

328. **Taccazzia Kirkii**, *N. E. Brown*; caule tomentoso, foliis ellipticis vel elliptico-oblongis obtusis cuspidato-apiculatis vel subacutis basi cordatis subcordatis vel obtuse rotundatis subtus tomentosis, pedunculis pedicellisque subglabris vel parce et breviter hirtis sepalis ovatis acutis plus minusve breviter hirtis, corolla glabra, coronæ lobis filiformibus erectis tortuosis, folliculis pubescentibus.

Habitat.—Zambesi region: Lupata and near Tete, *Kirk.* Natal, *Gerrard*, 1796.

Foliorum petioli 4–18 lin. longi, laminæ 1¼–4 poll. longæ, 1–2¼ poll. latæ. *Paniculæ* 2–4 poll. longæ. *Pedunculi* ½–¾ poll. longi. *Pedicelli* 1½–3 lin. longi. *Sepala* 1 lin. longa. *Corollæ lobi* 2½ lin. longi. *Folliculæ* 1½–2¼ poll. longæ, 3½–4½ lin. crassæ.

329. **Raphionacme angolensis**, *N. E. Brown;* caule pubescente erecto, foliis petiolatis ellipticis vel elliptico-oblongis obtusis utrinque pubescentibus, cymis terminalibus multifloris, pedicellis atque sepalis lanceolatis acuminatis pubescentibus, corollæ lobis oblongis vel oblongo-lanceolatis basi bicarinatis extus pubescentibus intus glabris, coronæ lobis subulatis.

Habitat.—Angola: Pungo Andongo, *Welwitsch*, 4201, 4202.

Foliorum petioli 2–7 lin. longi, laminæ 1–2¾ poll. longæ, ½–1¾ poll. latæ. *Pedicelli* 2–6 lin. longi. *Sepala* 1½–2 lin. longa. *Corollæ tubus* 2 lin. longus, lobi 4 lin. longi. *Coronæ lobi* 2½ lin. longi.

This is the plant described by the late Dr. Baillon as *Zaczatea angolensis*, in Bull. Soc. Linn. Paris, 1889, II., p. 806.

330. **Secamone retusa**, *N. E. Brown;* glabra, foliis oblongis vel ovato-oblongis retusis vel emarginatis apiculatis, cymis laxis pedunculatis, sepalis ellipticis obtusis, corollæ rotato-campanulatæ lobis oblongis obtusis, coronæ lobis minutis deltoideo-subulatis, stylo apice late obconico truncato-bilobo ultra antheras exserto.

Habitat.—Zanzibar, *Kirk.*

Foliorum petioli 1–1½ lin. longi, laminæ 1–2 poll. longæ, 7–10 lin. latæ. *Pedicelli* 1½–2 lin. longi. *Corolla* 2 lin. diam.

331. **Secamone Kirkii**, *N. E. Brown;* glabra, foliis elliptico-oblongis subabrupte acuminatis, cymis laxis pedunculatis, sepalis late ovatis subacutis ciliolatis, corollæ rotato-campanulatæ lobis oblongis obtusis, coronæ lobis falcatis acutis, stylo apice terete subacuto minute bilobulato ultra antheras exserto.

Habitat.—Zanzibar, *Kirk.*

Foliorum petioli 1½–2½ lin. longi, laminæ 1–2¼ poll. longæ, 6–16 lin. latæ. *Pedicelli* 2–3 lin. longi. *Sepala* ½ lin. longa. *Corolla* 2 lin. diam.

332. **Secamone gracilis**, *N. E. Brown;* glabra, ramis gracilibus, foliis oblongis obtusis basi rotundatis vel cuneatis, pedunculis 1–2-floris,

pedicellis gracilibus, sepalis ovatis vel oblongis obtusis vel subacutis, corollæ campanulatæ submembranaceæ lobis oblongis obtusis, coronæ lobis falcatis, stylo apice late obconico subtruncato-bilobo ultra antheras exserto.

Habitat.—Mombasa, *Wakefield.*

Foliorum petioli $\frac{3}{4}$–1 lin. longi, laminæ 4–8 lin. longæ, 2–4 lin. latæ. *Pedunculi* 1 lin. longi. *Pedicelli* 3 lin. longi. *Sepala* vix $\frac{1}{2}$ lin. longa. *Corolla* 2 lin. longa.

333. **Microstephanus,** *N. E. Brown* [Cynanchearum genus novum]. *Calyx* 5-partitus. *Corolla* campanulata, tubo brevi, lobis angustis contortis sinistrorsum obtegentibus. *Coronæ* lobi 5, minuti, cum antheris alterni. *Columna* staminum prope basin corollæ enata, 5-sulcata. *Antheræ* erectæ, oblongæ, membranaceo-appendiculatæ, dorso valde convexæ, basi sulcatæ. *Pollinia* in quoque loculo solitaria, pendula. *Stylus* ultra antheras longe productus, apice bifidus. *Folliculi* lanceolati, acuminati, læves. *Semina* comosa. *Fruticulus* procumbens vel volubilis. *Folia* opposita. *Cymæ* umbelliformes pauciforæ ad nodos laterales. *Flores* parvi.

A genus of one species, that has hitherto been placed under *Astephanus*, but it differs from that genus in the presence of a corona, which, although minute, is quite evident when searched for, and in the different structure of the staminal-column, the anther-wings being turned inwards towards the centre of the flower, forming five deep grooves between the anthers, whilst in *Astephanus* they are turned outwards in the usual way.

M. cernuus, *N. E. Brown;* foliis petiolatis oblongis ovatis ovato-lanceolatis ovato-oblongis vel ellipticis obtusis apiculatis vel acutis glabris vel plus minusve puberulis, cymis pedunculatis 1-4 floris, sepalis ovatis acutis glabris, corollæ campanulatæ lobis linearibus oblique obtusis leviter tortis glabris.—*Astephanus cernuus*, and *A. ovatus*, Decne, in Ann. Scien. Nat. 1838, ser. 2, ix., p. 342; and in DC. Prod. viii, p. 507; *A. arenarius*, Decne, in DC. Prod. viii., p. 507; *A. recurvatus*, Klotzsch in Peters Mossamb. p. 274. *Periploca ovata*, Poir. ex. Decne. in DC. Prod. viii. p. 508.

Habitat.—East Trop. Africa: Pemba Island, *Bojer;* Zanzibar, *Bojer, Kirk;* Mombasa, *Hildebrandt*, 1166, 1978: Mozambique, *Kirk, Scott:* Usambara, *Holst*, 3037; Madagascar, *Grévé, Elliot*, 3011, *Commerson, Baron*, 6192; Aldabra Island, *Abbott.*

Foliorum petioli 2–4 lin. longi, laminæ 3 lin.–1$\frac{3}{4}$ poll. longæ, 1$\frac{1}{2}$–8 lin. latæ. *Pedunculi* 1–2 lin. longi. *Pedicelli* 1$\frac{1}{2}$–2$\frac{1}{2}$ lin. longi. *Sepala* $\frac{1}{2}$ lin. longa. *Corollæ lobi* 1$\frac{1}{2}$–2 lin. longi.

The foliage of this plant varies very much in form and texture, being much thicker and more fleshy in some specimens than in others, but all intermediate stages occur, and there is no difference in the flowers of the different specimens. It is a maritime plant.

334. **Glossonema affine,** *N. E. Brown:* caulibus pubescentibus, foliis petiolatis ovatis obtusis apiculatis, subtus parce pubescentibus, cymis axillaribus sessilibus 2–3 floris, pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis oblongo-ovatis obtusis marginibus reflexis, coronæ lobis oblongis abrupte subulatis.

Habitat.—Abyssinia, *Schimper*, 2219.

Planta 6–10 poll. alta. *Foliorum petioli* 2–5 lin. longi, laminæ ½–1 poll. longæ, 3–7 lin. latæ. *Pedicelli* 1–1½ lin. longi. *Sepala* 1–1½ lin. longa. *Corollæ lobi* 1½ lin. longi. *Coronæ lobi* 1½ lin. longi.

335. **Schizostephanus somaliensis,** *N. E. Brown;* caule puberulo, foliis longe petiolatis cordatis obtusis emarginatis fere glabris, racemis foliis brevioribus floribus solitariis vel binis subdistantibus, sepalis lanceolato-oblongis subacutis, corollæ lobis oblongis subobtusis prope apicem saccatis marginibus revolutis, corona quinquelobata lobis cuneatis trifidis intus bicarinatis.

Habitat.—Somaliland: Boobi, *James & Thrupp*.

Foliorum petioli 1¼–2 poll. longi, laminæ 1½–3 poll. longæ, 1¾–2½ poll. latæ. *Racemi* 2–3 poll. longi. *Pedicelli* 1–1½ lin. longi. *Sepala* 1–1¼ lin. longa. *Corollæ lobi* 1¾ lin. longi, 1 lin. lati. *Coronæ lobi* 1½ lin. longi.

336. **Platykeleba,** *N. E. Brown* [Cynanchearum genus novum].—*Calyx* 5-partitus. *Corolla* late rotato-campanulata, breviter 5-loba. *Corona* duplex, exterior basi corollæ semiadnata, breviter cupularis, subintegra crenulata vel sub-5-lobata, interioris lobi 5, antheris basi adnati, ovati, concavi, cum corona exteriore partitionibus 5 connexi. *Columna* staminum e basi corollæ exorta; antheræ breves, latæ, membrana inflexa appendiculatæ. *Pollinia* in quoque loculo solitaria, pendula. *Stigma* breviter rostrata, biloba.—*Frutex* aphyllus. *Umbellæ* pauciflorae, ad nodos sessiles. *Flores* majusculi.

A genus of one species, rather remarkable in appearance, with flowers resembling those of *Oxystelma*, to which genus it is probably nearest allied.

P. insignis, *N. E. Brown;* glabra, ramulis subgracilibus subsucculentibus, umbellis 4–5-floris, sepalis ovatis vel ovato-lanceolatis acutis, corolla purpureo-venosa.

Habitat.—Central Madagascar, *Baron*, 973.

Rami sicci 1 lin. crassi. *Pedicelli* 2–3 lin. longi. *Sepala* ¾–1 lin. longa. *Corolla* circa 8 lin. diam., lobi 2 lin. longi, 3 lin. lati. *Corona exterior* 1½ lin. diam., coronæ interioris lobi ½ lin. longi, ⅓ lin. lati.

337. **Xysmalobium Carsoni,** *N. E. Brown;* caule simplice glabro, foliis linearibus acutis glabris, umbellis paucis lateralibus terminalibusque pedunculatis 3–4-floris, sepalis lanceolatis acutis glabris, corollæ lobis elliptico-oblongis obtusis glabris, coronæ lobis quam columna staminum paulo longioribus planis oblongis apice obtusis subdenticulatis incurvatis marginibus incurvatis.

Habitat.—Tanganyika Plateau: Fife station, *Carson*.

Caules 1–2 ped. alti. *Folia* 3–6 poll. longa, 1–1½ lin. lata. *Pedunculi* et *pedicelli* 4–6 lin. longi. *Sepala* 2 lin. longa. *Corollæ lobi* 5–6 lin. longi, 3–4 lin. lati. *Coronæ lobi* 2⅓ lin. longi, 1 lin. lati.

338. **Xysmalobium decipiens,** *N. E. Brown;* caulibus simplicibus bifariam pubescentibus, foliis linearibus acutis glabris, umbellis lateralibus terminalibusque pedunculatis multifloris, corollæ lobis arcte reflexis

oblongis acutis glabris, coronæ lobis minutis ovatis obtusissimis columnæ staminum adnatis et subtriplo brevioribus basi cum dentibus minutis alternantibus connexis.

Habitat.—Angola : Huilla, near Lopollo, *Welwitsch*, 4175.

Caules 1–1¼ ped. alti. *Folia* 3½–6 poll. longa, ½–1 lin. lata. *Pedunculi* 5–7 lin. longi. *Pedicelli* 3–4 lin. longi. *Sepala* ¾ lin. longa. *Corollæ lobi* 1¾ lin. longi, ½ lin. lati. *Coronæ lobi* ⅓ lin. longi. *Columna staminum* 1¼ lin. longa.

This species was confused with *X. Holubii*, S. Elliot, and in the original description the characters of the corona of *X. Holubii*, are unfortunately taken from this plant instead of from that collected by Holub, for which the name was intended. I retain the name *X. Holubii*, S. Elliot for Holub's plant, in which the coronal lobes are narrow-oblong obtuse, quite free from each other, and without any alternating tooth between them.

339. **Xysmalobium reticulatum**, *N. E. Brown ;* caule erecto subflexuoso bifariam pubescente, foliis breviter petiolatis anguste oblongis obtusis vel acutis apiculatis basi rotundatis vel emarginatis venis conspicuis reticulatis, sepalis reflexis lanceolatis acuminatis glabris, corollæ lobis reflexis ovatis acutis glabris, coronæ lobis quam columna staminum brevioribus obovatis plano-convexis intus carinatis.

Habitat.—Shire Highlands, *Buchanan.*

Foliorum petioli ½-1 lin. longi, laminæ 2–2¾ longæ, 3–7 lin. latæ. *Pedicelli* 3–4 lin. longi. *Sepala* 2½ lin. longi. *Corollæ lobi* 2½ lin. longi, 1¼ lin. lati. *Coronæ lobi* 1 lin. longi.

340. **Xysmalobium membraniferum**, *N.E. Brown ;* caulibus bifariam pubescentibus, foliis oblongo-lanceolatis utrinque acutis glabris, umbellis lateralibus sessilibus 6–8-floris, pedicellis pubescentibus, sepalis ovatis acutis glabris, corollæ-lobis oblongis subobtusis, coronæ lobis oblongis subacutis basi carinatis.

Habitat.—Sierra Leone : near Falaba, *Elliot*, 5184.

Caules 1–1½ ped. alti. *Foliorum petioli* 2–4 lin longi, laminæ 3–3½ poll. longæ. 4-7 lin. latæ. *Pedicelli* 4–7 lin. longi. *Sepala* 2 lin. longa. *Corollæ lobi* 3½ lin. longi, 1½ lin lati. *Coronæ lobi* 1¾ lin. longi.

341. **Xysmalobium spurium**, *N.E. Brown;* erectum, patente pubescens, foliis elongato-ovatis subobtusis basi rotundatis vel subcordatis, umbellis lateralibus et terminalibus pedunculatis 5–6 floris, corollæ campanulatæ lobis ovato-oblongis subacutis extus pubescentibus, coronæ lobis e basi staminum columnæ exortis et duplo longioribus erectis cuneato-oblongis dorso leviter carinatis apice irregulariter 3-dentatis.

Habitat.—Nyassaland : Shire Highlands, *Buchanan*, 451.

Caules 2–4 ped. alti. *Foliorum petioli* 2–4 lin. longi, laminæ 2–3½ poll. longæ 1–1½ poll. latæ. *Pedunculi* 1¼–1½ poll. longi. *Pedicelli* 9–10 lin. longi. *Corollæ lobi* 8–9 lin. longi, 3½–4 lin. lati. *Coronæ lobi* 6 lin. longi, 2½-3 lin. lati.

342. **Xysmalobium rhomboideum**, *N. E. Brown ;* caulibus validis tomentosis, foliis ovato-oblongis subobtusis apiculatis basi cordatis vel rotundatis parce pubescentibus, umbellis lateralibus sessilibus 6–8-floris,

pedicellis subtomentosis, sepalis anguste lanceolatis acutis breviter hirtis, corollæ campanulatæ lobis ovatis subacutis extus pubescentibus, coronæ lobis e basi staminum columnæ æquilongæ exortis, erectis rhomboideis subacutis intus carinatis.

Habitat.—Angola : Huilla, *Welwitsch*, 4193.

Foliorum petioli 1½–2½ lin. longi, laminæ 1¼–3 poll. longæ, 9–13 lin. latæ. *Pedicelli* 5–6 lin. longi. *Sepala* 3½–4 lin. longa. *Corollæ lobi* 3 lin. longi, 2 lin. lati. *Coronæ lobi* 1½ lin. longi.

343. **Xysmalobium fraternum**, *N. E. Brown ;* foliis oblongis vel obovato-oblongis obtusis apiculatis, basi angustatis glabris, umbellis lateralibus 7–8 floris, pedicellis pubescentibus, sepalis lanceolatis acuminatis glabris parce ciliatis, corollæ lobis ovatis acutis reflexis, coronæ lobis rhomboideo-ovatis subacutis intus carinatis.

Habitat.—Nyassaland : Shire Highlands, near Blantyre, *Last.*

Foliorum petioli 1½–2 lin. longi, laminæ 1½–2½ poll. longæ, 9–18 lin. latæ. *Pedicelli* 5–6 lin. longi. *Sepala* 2½–3 lin. longa. *Corollæ lobi* 3 lin. longi 1½ lin. lati. *Coronæ lobi* 1½ lin. longi.

344. **Schizoglossum firmum**, *N. E. Brown ;* caulibus validis tomentosis, foliis elongato-ovato-oblongis subobtusis apiculatis basi cordatis petiolatis tomentosis, umbellis lateralibus pedunculatis 10–20-floris, pedicellis sepalisque lanceolatis acuminatis tomentosis, corollæ lobis ovatis subobtusis minute bifidis extus pubescentibus, coronæ lobis quam columna staminum duplo longioribus erectis basi late oblongis in subulam elongatam abrupte contractis intus carinis duobus contiguis.

Habitat.—Angola : Huilla, near Lopollo, *Welwitsch*, 4191.

Foliorum petioli 1–2½ lin. longi, laminæ 2½–3 poll. longæ, 6–12 lin. latæ. *Pedunculi* 9 lin.–1½ poll. longi. *Sepala* 2½–3 lin. longa. *Corollæ lobi* 2½ lin. longi, 1¾ lin. lati. *Coronæ lobi* 3 lin. longi.

345. **Schizoglossum quadridens**, *N. E. Brown* ; caulibus erectis patente pubescentibus, foliis breviter petiolatis lanceolatis vel lineari-lanceolatis acutis vel subacutis vel inferioribus subobtusis basi angustatis vel subrotundatis vel truncatis pubescentibus marginibus revolutis, umbellis paucis lateralibus et terminalibus ad apicem caulis subcorymbosis pedunculatis, pedunculis pedicellis atque sepalis lanceolatis acutis patente pubescentibus, corollæ lobis oblongis obtusis extus parce pubescentibus intus pubescentibus albis, coronæ lobis quam columna staminum paulo longioribus planis ovatis basi subcordatis apice bidentatis intus prope apicem dentibus duobus falcatis subporrectis et leviter bicarinatis extus basi obtuse carinatis.

Habitat.—South Africa : the Plateau, East Griqualand, *Haygarth* (Herb. *Wood*, 4189.)

Planta 4–6 poll. alta. *Foliorum petioli* 1–2½ lin. longi, laminæ 1¼–2 poll. longæ, 1½–7 lin. latæ. *Pedunculi* 5–16 lin. longi. *Pedicelli* 3–5 lin. longi *Sepala* 2–3 lin. longa. *Corollæ lobi* 3–3¼ lin. longi, 1½ lin. lati. *Coronæ lobi* 1¼ lin. longi.

This much resembles *S. elingue*, N. E. Br. in appearance, but has very different coronal-lobes.

346. **Schizoglossum masaicum**, *N. E. Brown ;* caulibus gracilibus simplicibus vel sparse ramosis pubescentibus, foliis lineari-filiformibus

glabris, umbellis plurimis lateralibus sessilibus 7–12 floris, pedicellis sepalisque ovato-lanceolatis acuminatis pubescentibus, corollæ lobis oblongis subacutis pubescentibus marginibus plus minusve reflexis, coronæ lobis subquadratis obtusissimis intus unicornutis et bicarinatis cornibus supra antheras incurvatis.

Habitat.—Kilimanjaro Region: Maungu, 2000 feet, *Johnston.*

Caules 1½–2 ped. alti. *Folia* 1–2 poll. longa, ½–¾ lin. lata.

Pedicelli 1½–2 lin. longi. *Corollæ lobi* 1–1¼ lin. longi. *Coronæ lobi* cornua inclusa ½ lin. longi.

347. **Schizoglossum shirense**, *N. E. Brown;* caulibus simplicibus vel raro ramosis bifariam pubescentibus, foliis linearibus puberulis demum glabris marginibus revolutis, umbellis plurimis lateralibus sessilibus 3–8-floris, pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis oblongo-lanceolatis acutis extus glabris intus pubescentibus fusco-purpureis, coronæ lobis subquadratis tridentatis dente intermedio longissimo subulato erecto recurvato intus cornu longo instructis et leviter bicarinatis.

Habitat.—Zambesi Region: Shupanga, *Kirk*; Shire Valley, *Kirk, Waller.*

Caules 2–3 ped. alti. *Folia* 1½–3 poll. longa, ½–2 lin. lata. *Pedicelli* 1–2 lin. longi. *Sepala* 1 lin. longa. *Corollæ lobi* 2½ lin. longi, ¾ lin. lati. *Coronæ lobi* 2–2¼ lin. longi.

348. **Schizoglossum multifolium**, *N. E. Brown;* caulibus simplicibus crassiusculis dense pubescentibus multifoliatis, foliis verticillatis subsessilibus vel brevissime petiolatis cuneato-oblongis vel ellipticis obtusis basi acutis vel leviter rotundatis glabris marginibus revolutis scaberulis, umbellis plurimis lateralibus sessilibus, pedicellis puberulis, sepalis lanceolatis acutis fere glabris, corollæ lobis ovatis subacutis glabris, coronæ lobis subquadratis tridentatis dente intermedio elongato subulato lateralibus minutis intus leviter carinatis.

Habitat.—Nyassaland, *Buchanan*, 965.

Caules 1½–2½ ped. vel ultra alti. *Folia* 1–2 poll. longa, 3–12 lin. lata. *Pedicelli* 2 lin. longi. *Corollæ lobi* 2 lin. longi. *Coronæ lobi* 1¼ lin. longi.

349. **Asclepias Schweinfurthii**, *N. E. Brown;* caule simplice pubescente, foliis cordatis vel cordato-lanceolatis plus minusve obtusis apiculatis glabris subtus leviter scaberulis, umbellis lateralibus pedunculatis, pedicellis sepalisque lanceolato-attenuatis acutis pubescentibus, corollæ lobis elliptico-ovatis acutis extus puberulis, coronæ lobis stellato-adscendentibus complicatis lateribus inflexis dolabriformibus apice breviter productis obtusis intus leviter gibbosis (an semper ?).

Habitat.—Jur: Ghattas, *Schweinfurth*, 1960.

Foliorum petioli 1–2 lin. longi, laminæ 2–3½ poll. longæ, 1–2½ poll. latæ. *Pedunculi* 1¼–2¾ poll. longi. *Pedicelli* 8–12 lin. longi. *Sepala* 4 lin. longa. *Corollæ lobi* 6 lin. longi, 3–3½ lin. lati. *Coronæ lobi* 3–3½ lin. longi.

350. **Asclepias conspicua**, *N. E. Brown;* caulibus ramosis subhispidis, foliis elongato-ovatis acutis basi cordatis scabris, umbellis paucis 3–4-floris pedunculatis, pedunculis pedicellis sepalisque lanceolatis acuminatis hispidulis, corollæ lobis elliptico-oblongis subacutis ciliolatis

extus puberulis, coronæ lobis oblongis complicatis intus bicarinatis lateribus inflexis infra medium dentatis.

Habitat.—Fwambo, south of Lake Tanganyika, *Carson*, 12.

Foliorum petioli, 1–3 lin. longi, laminæ 1½–2½ poll. longæ, ½–1 poll. latæ. *Pedunculi* 2½–4 poll. longi. *Sepala* 3–4 lin. longa. *Corollæ lobi* 6–7 lin. longi, 4–4½ lin. lati. *Coronæ lobi* 4 lin. longi.

351. **Asclepias fulva,** *N. E. Brown ;* caule simplice ferrugineo-pubescente, foliis oblongis subacutis basi subcordatis vel emarginatis utrinque ferrugineo-pubescentibus demum glabratis, umbellis paucis 6–8-floris pedunculatis, sepalis lineari-lanceolatis acutis reflexis ferrugineo-puberulis, corollæ lobis ovatis subacutis reflexis extus ferrugineo-puberulis, coronæ lobis subquadratis oblique rostratis rostro complicato-bipartito supra antheras inflexo.

Habitat.—Uganda, *Wilson*, 112.

Foliorum petioli 1–2 lin. longi, laminæ 1½–3 poll. longæ, ½–1 poll latæ. *Pedunculi* 1½–2 poll. longi. *Pedicelli* 6–9 lin. longi. *Sepala* 3 lin. longa. *Corollæ lobi* 5 lin. longi, 3 lin. lati. *Coronæ lobi* 2 lin. longi.

352. **Asclepias albida,** *N. E. Brown ;* caulibus elatis pubescentibus, foliis brevissime petiolatis linearibus acuminatis basi cuneatis marginibus revolutis fere glabris, umbellis lateralibus pedunculatis 4–10-floris, pedicellis sepalisque lanceolatis acuminatis pubescentibus, corollæ lobis reflexis ellipticis obtusis extus glabris intus microscopice puberulis, coronæ lobis quam columna staminum subduplo longioribus complicatis marginibus apicalibus ad medium incisis cum dentibus late falcatis ex angulis interioribus reflexis intus nudis basi utrinque gibbosis.

Habitat.—Abyssinia, *Schimper*, 27.

Folia 4–6 poll. longa, 1–2½ lin. lata. *Pedunculi* ¾–1¼ poll. longi *Pedicelli* ¾–1 poll. longi. *Sepala* 3–3½ lin. longa. *Corollæ lobi* 6 lin. longi, 3½–4 lin. lati. *Coronæ lobi* 3 lin. longi.

353. **Asclepias propinqua,** *N. E. Brown ;* caule humili pubescente, foliis linearibus vel lineari-filiformibus marginibus revolutis subtomentosis, umbellis terminalibus pedunculatis 3–4 - floris, pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis ovato-oblongis subobtusis, coronæ lobis quam columna staminum multo longioribus complicatis apice obtuse rotundatis lateribus inflexis in dentes falcatos productis sursum directis intus dente oblongo obtuso instructis.

Habitat.—Kilimanjaro, *Smith.*

Folia ¾–1¼ poll. longa, ½–1 lin. lata. *Pedunculi* 1–1¾ poll. longi. *Pedicelli* 7½–12 lin. longi. *Sepala* 2½–3 lin. longa. *Corollæ lobi* 5 lin. longi, 3 lin. lati. *Coronæ lobi* 3–3½ lin. longi.

354. **Asclepias spectabilis,** *N. E. Brown ;* caulibus validis pubescentibus, foliis lanceolatis acutis basi plus minusve rotundatis pubescentibus, umbellis lateralibus terminalibusque pedunculatis, pedicellis sepalisque lanceolatis acuminatis pubescentibus, corollæ lobis oblongis obtusis plus minusve replicatis, coronæ lobis quam columna staminum longioribus complicatis apice oblongo-ovatis obtusis lateribus inflexis in dentes falcatos acutos vel lineari-oblongos truncatos productis prope basin utrinque gibbosis intus cornu subulato vel oblongo instructis.

Habitat.—Nyassaland ; *Buchanan*, 441, 553 ; Blantyre, *Last ;* Magomera Mission Station, 3000 feet, *Waller.*

Foliorum petioli 1–6 lin. longi, laminæ 3½–7 poll. longæ, 1–2 poll. latæ. *Pedunculi* ¾–1¾ poll. longi. *Pedicelli* ¾–1¼ poll. longi. *Sepala* 4–4½ lin. longa. *Corollæ lobi* 9 lin. longi, 3½ lin. lati. *Coronæ lobi* 4 lin. longi.

355. **Asclepias flavida,** *N. E. Brown* ; fruticosa, ramosa, ramis patentibus albo-tomentosis, foliis linearibus acutis marginibus revolutis glabris subtus secus costam pubescentibus, umbellis ad nodos lateralibus pedunculatis 4–6-floris, pedunculis pedicellis atque sepalis anguste lanceolatis acuminatis albo-tomentosis, corolla profunde 5–loba reflexa lobis elliptico-ovatis acutis glabris in uno margine ciliatis, coronæ lobis supra staminum columnæ basin exortis et columnæ apicem attingentibus complicatis subquadratis angulis interioribus dentibus falcatis abrupte reflexis instructis intus ecornutis, folliculis immaturis ellipsoideis breviter cuspidato-rostratis parce setosis subglabris.

Habitat.—Somaliland: Darsa, Surry, Golis Range, *Miss Cole*, *Mrs. Lort Phillips.*

Frutex 3–4½ ped. altus. *Folia* 1½–3 poll. longa, 1–3 lin. lata. *Pedunculi* 7–11 lin. longi. *Pedicelli* 7–11 lin. longi. *Sepala* 1½–2 lin. longa. *Corollæ lobi* 4 lin. longi, 2½ lin. lati. *Coronæ lobi* 2 lin. longi, 1½ lin. lati. *Columna staminum* 2½ lin. longa.

356. **Asclepias tenuifolia,** *N. E. Brown* ; caulibus tenuibus ramosis pubescentibus, foliis filiformibus pubescentibus, umbellis lateralibus et terminalibus pedunculatis 3–5-floris, pedunculis pedicellis sepalisque lanceolatis acuminatis pubescentibus, corollæ lobis ellipticis subobtusis extus pubescentibus, coronæ lobis complicatis fere semiorbiculatis apice truncatis lateribus ad apicem in dentes porrectos productis.

Habitat.—Matabeleland, *Baines.*

Folia 1–2½ poll. longa. *Pedunculi* 4–6 lin. longi. *Pedicelli* 4–5 lin. longi. *Sepala* 1–1¼ lin. longa. *Corollæ lobi* 2–2¼ lin. longi, 1½ lin. lati. *Coronæ lobi* 1 lin. longi.

357.—**Asclepias pygmæa,** *N. E. Brown* ; nana, caulibus pubescentibus, foliis linearibus acutis scaberulis, umbellis paucis subcorymbosis pedunculatis 4–6-floris, pedunculis pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis oblongis subobtusis extus pubescentibus, coronæ lobis stellato-radiantibus complicatis lateribus ad basin in dentes erectos late deltoideos productis.

Habitat.—The lower plateau north of Lake Nyassa, *Thomson.*

Planta 3–4 poll. alta. *Folia* 1–2 poll. longa, ½ lin. lata. *Pedunculi* 6–9 lin. longi. *Pedicelli* 4–6 lin longi. *Sepala* 2 lin. longa. *Corollæ lobi* 2½–3 lin. longi, 1½ lin. lati. *Coronæ lobi* 2 lin. longi.

358. **Margaretta distincta,** *N. E. Brown* ; erecta pubescens, foliis breviter petiolatis oblongis vel lanceolato-oblongis subobtusis basi cordatis, umbellis pedunculatis lateralibus et terminalibus 6–10-floris, sepalis lanceolato-acuminatis, corollæ campanulatæ lobis ovato-oblongis subobtusis non revolutis, coronæ lobis quam columna staminum duplo longioribus erectis basi anguste complicatis tridentatis superne in laminas cuneato-oblongas vel spathulato-oblongas expansis apice denticulatis.

Habitat.—Mountains east of Lake Nyassa, *Johnson.*

Folia 2–4 poll. vel ultra longa, 5–9 lin. lata. *Pedunculi* 1–2 poll. longi. *Pedicelli* 6–8 lin. longi. *Sepala* 3½–4 lin. longa. *Corollæ lobi* 5 lin. longi, 2½–3 lin. lati. *Coronæ lobi* 3 lin. longi.

359. **Margaretta orbicularis**, *N. E. Brown;* caulibus simplicibus pubescentibus, foliis brevissime petiolatis linearibus vel lineari-lanceolatis acutis vel acuminatis utrinque pubescentibus, umbellis paucis subcorymbosis pedunculatis, pedunculis pedicellis atque sepalis lanceolato-acuminatis subtomentosis, corollæ lobis oblongis obtusis apice revolutis, coronæ lobis basi complicato-bidentatis abrupte in laminas orbiculatas expansis.

Habitat.—Nyassaland: Moravi country, west of Lake Nyassa, *Kirk;* Elephant Marsh, north Nyassa, *Scott.*

Caules ½–2 ped. alti. *Folia* 2–4¾ poll. longa, 2–7 lin. lata. *Pedunculi* ¼–3½ poll. longi. *Pedicelli* 2–4 lin. longi. *Sepala* 2–2¼ lin. longa. *Corollæ lobi* 3½–4 lin. longi, 1¼–1¾ lin. lati. *Coronæ lobi* 4–4½ lin. longi, 3–4 lin. lati.

360. **Cynanchum complexum**, *N. E. Brown;* volubile, foliis cordatis acutis vel obtusis mucronatis glabris, umbellis pedunculatis 8–12 floris, sepalis ovatis acutis, glabris, corollæ lobis lineari-oblongis obtusis glabris, corona tubulosa 10-dentata intus lobis 5 brevibus complicatis instructa dentibus subulatis subæqualibus.

Habitat. — Shire Valley above the Cataracts, Shamo, and near Mazzaro, *Kirk.* Shupanga Forest and Chiloane, *Scott.*

Foliorum petioli ½–1½ poll. longi, laminæ 1–2 poll. longæ, 7½–16 lin. latæ. *Pedunculi* 4–18 lin. longi. *Pedicelli* 3–5 lin. longi. Sepala ¾ lin. longa. *Corollæ lobi* 2–3 lin. longi, ¾ lin. lati. *Coronæ tubus* 1–1¼ lin. longus, dentes 1 lin. longi.

361. **Cynanchum fraternum**, *N. E. Brown;* volubile, foliis oblongo-ovatis acuminatis basi rotundatis vel cordatis, racemis brevibus umbelliformibus pedunculatis, pedunculis pedicellisque puberulis, sepalis late ovatis subacutis parce pubescentibus, corollæ lobis oblongis obtusis glabris, corona tubulosa 10-dentata intus nuda dentibus lineari-filiformibus alternis multo brevioribus.

Habitat. — Abyssinia: Tigré, *Schimper;* near Djeladjeranne, *Schimper*, 1802.

Foliorum petioli 2–6 lin. longi, laminæ ¾–2 poll. longæ, 4–12 lin. latæ. *Pedunculi* 1–4 lin. longi. *Pedicelli* 1½–4 lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* 1 lin. longi. *Coronæ tubus* ½–⅔ lin. longus, dentes longiores 1–1¼ lin. longi, dentes breviores ¼–⅓ lin. longi.

362. **Cynanchum clavidens**, *N. E. Brown;* ramis lignosis gracilibus, foliis hastatis acutis vel obtusis glabris, umbellis sessilibus 5–6-floris, pedicellis puberulis sepalis ovatis vel lanceolatis acutis puberulis, corollæ lobis lanceolatis obtusis marginibus revolutis, corona tubulosa 10-dentata intus 10-plicata, dentibus clavatis alternis brevioribus.

Habitat.—Somaliland: Boobi, *James & Thrupp.*

Foliorum petioli 6–8 lin. longi, laminæ 6–12 lin. longæ, basi 3½–4 lin. latæ. *Pedicelli* 2½–4 lin. longi. *Sepala* ¾–1½ lin. longa. *Corollæ lobi* 2 lin. longi, ¾ lin. lati. *Coronæ tubus* ⅔ lin. longus, dentes longiores ⅓ lin. longi.

363. **Cynanchum hastifolium,** *N. E. Brown;* volubile, foliis hastatis acutis glabris, umbellis sessilibus paucifloris, pedicellis sepalisque subulatis puberulis, corollæ lobis linearibus acutis marginibus revolutis, corona tubulosa 10-dentata intus carinarum paribus 5 instructa dentibus elongato-deltoideis et filiformibus alternantibus cum denticulis minutis interjectis.

Habitat.—Abyssinia: near Djeladjeranne, *Schimper*, 1690.

Foliorum petioli 3–6 lin. longi, laminæ 4–16 lin. longæ, basi 3–7 lin. latæ. *Pedicelli* 2–3 lin. longi. *Sepala* 1 lin. longa. *Corollæ lobi* $2\frac{1}{2}$–3 lin. longi, $\frac{1}{2}$–$\frac{3}{4}$ lin. lati. *Coronæ tubus* $1\frac{1}{3}$ lin. longus, dentes $\frac{2}{3}$ lin. longi.

364. **Cynanchum vagum,** *N. E. Brown;* volubile, foliis elongato-ovato-oblongis acutis vel acuminatis basi cordatis glabris vel parce pubescentibus, cymis umbelliformibus multifloris pedunculatis, pedunculis pedicellis atque sepalis ovatis acutis pubescentibus, corollæ lobis ovatis subacutis glabris, corona cupulari 5-loba lobis bidentatis dentibus brevibus linearibus distantibus.

Habitat.—Congo, near Stanley Pool, *Hens*, 77.

Foliorum petioli 3–8 lin. longi, laminæ 1–$2\frac{1}{4}$ poll. longæ, 4–10 lin. latæ. *Pedunculi* 1–2 lin. longi. *Pedicelli* 1–$3\frac{1}{2}$ lin. longi. *Sepala* $\frac{1}{2}$ lin. longa. *Corollæ lobi* $\frac{2}{3}$–$\frac{3}{4}$ lin. longi. *Corona* $\frac{1}{2}$ lin. longa.

365. **Cynanchum brevidens,** *N. E. Brown;* volubile, foliis elongato-oblongis acuminatis basi cordatis glabris vel parce pubescentibus, racemis brevibus umbelliformibus pedunculatis, pedunculis pedicellis atque sepalis ovatis acutis pubescentibus, corollæ lobis ovato-oblongis subobtusis glabris, corona cupulari breviter 5-dentata intus 10-carinata.

Habitat.—Congo, *Burton.*

Foliorum petioli 3–11 lin. longi, laminæ 1–2 poll. longæ, 4–9 lin. latæ. *Pedunculi* 1–3 lin. longi. *Pedicelli* 1–4 lin. longi. *Sepala* $\frac{1}{2}$–$\frac{3}{4}$ lin. longa. *Corolla lobi* $\frac{2}{3}$–$\frac{3}{4}$ lin. longi. *Corona* circa $\frac{1}{3}$ lin. longa.

Var. **zambesiacum,** *N. E. Brown;* corona $\frac{1}{2}$ lin. longa infra medium quinque lobata cum dentibus 5 minutis alternantibus lobis in subulam brevem acuminatis vel abruptissime contractis.

Habitat.—Zambesi: Expedition Island, *Kirk.*

366. **Tylophora oblonga,** *N. E. Brown;* volubilis glabra, foliis petiolatis oblongis vel elliptico-obovatis breviter cuspidato-acuminatis basi late cuneatis vel cuneato-rotundatis, pedunculis cymas 3–4 umbelliformes distantes gerentibus, sepalis ovatis acutis, corollæ rotatæ lobis oblique-oblongo-obovatis apice rotundatis minute fimbriatis, coronæ lobis minutis tuberculiformibus supra planis subtus convexis.

Habitat.—Fernando Po, *Mann*, 277.

Foliorum petioli 6–9 lin. longi, laminæ $2\frac{1}{4}$–3 poll. longæ, 1–$1\frac{3}{4}$ poll. latæ. *Inflorescentia* 2–3 poll. longa. *Pedicelli* 3–4 lin. longi. *Sepala* $\frac{2}{3}$–$\frac{3}{4}$ lin. longa. *Corolla* $3\frac{1}{2}$–4 lin. diam., lobis $1\frac{1}{2}$ lin. longis, 1 lin. latis.

367. **Tylophora stenoloba,** *N. E. Brown;* caule volubili pubescente, foliis petiolatis oblongis vel elliptico-oblongis obtusis mucronulatis basi obtusis vel cuneato-rotundatis glabris, umbellis ad nodos sessilibus plurifloris, pedicellis capillaribus glabris, sepalis lanceolatis acuminatis glabris, corollæ lobis e basi ovata linearibus apice leviter dilatatis glabris,

coronæ lobis tuberculiformibus basi truncatis superne angustatis.—*Astephanus stenolobus*, K. Schum. in Engler Pflanzenw. Ost.-Afr. Th. C. p. 321.

Habitat.—Usambara: Doda, *Holst*, 2977*a*.

Foliorum petioli 1½–2 lin. longi, laminæ 9–15 lin. longæ, 4–8 lin. latæ. *Pedicelli* 7–8 lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* 2½ lin. longi.

This plant has been placed by Dr. Schumann in the genus *Astephanus* among the *Cynancheæ*, but the whole structure of the flower is that of a *Tylophora*.

368. **Tylophora conspicua**, *N. E. Brown;* caule volubili tomentoso, foliis petiolatis oblongis vel obovato-oblongis breviter acuminatis vel cuspidatis basi cordatis, glabris venis pubescentibus, pedunculis pubescentibus cymas 2 umbelliformes gerentibus, sepalis ovato-lanceolatis acutis pubescentibus, corollæ rotatæ glabræ lobis oblique orbiculari-oblongis obtusis, coronæ lobis tuberculiformibus ovoideis.

Habitat.—Angola: Golungo Alto, *Welwitsch*, 4214, 4215.

Foliorum petioli 9 lin.—2¾ poll. longi, laminæ 2½–7 poll longæ, 1¾-3½ poll. latæ. *Pedunculi* 9-12 lin. longi. *Pedicelli* 3–4 lin. longi. *Sepala* 2 lin. longa. *Corolla* 7–8 lin. diam., lobis 2½ lin. longis et latis. *Coronæ tuberculi*, 1 lin. longi.

369. **Tylophora cameroonica**, *N. E. Brown;* caule volubili glabro, foliis petiolatis ovatis vel elliptico-ovatis cuspidato-acuminatis basi cordatis glabris, cymis laxis ramulis cymulas umbelliformes plurimas gerentibus primum ferrugineo-puberulis demum glabratis, sepalis lanceolatis acutis glabris, corollæ rotatæ lobis ovatis subobtusis, coronæ lobis tuberculiformibus.

Habitat.—Cameroons: Rio del Rey, *Johnston.*

Foliorum petioli 9–15 lin longi, laminæ 3–5½ poll. longæ, 2–3 poll. latæ. *Cymæ* 4–5 poll. diam. *Pedicelli* 1½–2 lin longi. *Sepala* ½–⅔ lin. longa. *Corolla* 2½ lin. diam., lobis 1 lin. longis, ¾ lin. latis. *Coronæ lobi* ⅓ lin. longi.

370. **Marsdenia angolensis**, *N. E. Brown:* volubilis, foliis cordato-ovatis acuminatis supra pubescentibus subtus subtomentosis, cymis laxis ramulis apice umbelliferis pubescentibus umbellis 10–14-floris, sepalis obovato-oblongis vel elliptico-oblongis obtusis, corollæ campanulatæ lobis elliptico-oblongis obtusis extus pubescentibus intus glabris, coronæ lobis lineari-oblongis basi dilatatis bicarinato-alatis.

Habitat.—Angola, *Welwitsch*, 4245, 4250.

Foliorum petioli 1–1½ poll. longi, laminæ 2–3 poll. longæ, 1¼–2 poll. latæ. *Pedicelli* 4–5 lin. longi. Sepala ¾–1 lin. longa, ½–¾ lin. lata. *Corollæ tubus* 1½–2 lin. longus, lobi ⅔–1 lin. longi. *Coronæ lobi* 1½ lin. longi.

371. **Marsdenia profusa**, *N. E. Brown;* volubilis, foliis elliptico-cordatis cuspidatis vel acuminatis glabris, paniculis e 3–5 ramulis compositis umbellas plurimas sessiles gerentibus sepalis late ellipticis obtusis minutissime ciliatis, corollæ rotato-campanulatæ lobis ovatis acutis glabris, coronæ lobis oblongis subacutis planis.

Habitat.—Niger Territory: Brass, *Barter*, 16.

Foliorum petioli 1–2 poll. longi, laminæ 3–5 poll. longæ, 2–3¼ poll. latæ. *Paniculæ* 5–8 poll. longæ. *Pedicelli* 1¼–1¾ lin. longi. *Sepala* ½ lin. longa. *Corolla* 1½ lin. diam. *Coronæ lobi* ¼ lin. longi.

372. **Anisopus**, *N. E. Brown;* [Marsdeniearum genus novum]. *Calyx* 5-partitus. *Corollæ* tubus brevis; limbus 5-lobus, lobis patentibus valvatis. *Corona* duplex; exterioris lobi 5 sub sinubus corollæ affixi; interioris lobi 5 columnæ staminum affixi antheris oppositi. *Columna staminum* e basi corollæ exorta; antheræ erectæ, membranaceo-appendiculatæ. *Pollinia* in quoque loculo solitaria, erecta. *Stylus* ultra antheras breviter exsertus, apice bifidus.—*Frutex* volubilis, glaber. *Folia* opposita. *Umbellæ* axillares, oppositæ, altera pedunculata altera sessilis.

Anisopus Mannii, *N. E. Brown;* foliis herbaceis petiolatis ellipticis vel elliptico-oblongis abrupte acuminatis basi rotundatis, umbellis globosis multifloris solitariis vel pedunculis 2–4 fasciculatis bracteatis, bracteis foliosis, sepalis elliptico-ovatis obtusis, corollæ lobis ovatis subacutis extus glabris intus pubescentibus, coronæ exterioris lobis semiorbiculatis pubescentibus, coronæ interioris lobis carnosis lineari-oblongis columnæ staminum æquilongis basi adnatis apice liberis incurvis acutis obtusis vel minute bifidis dorso canaliculatis.

Habitat.—Corisco Bay, *Mann*, 1862.

Foliorum petioli ½–¾ poll. longi, laminæ 2¼–3 poll. longæ, 1¼–1¾ poll. latæ. *Pedunculi* ½–2 poll. longi. *Pedicelli* 3½–4 lin. longi. *Sepala* ¾ lin. longa. *Corollæ tubus* 1–1¼ lin. longus, lobi 1½ lin. longi. *Coronæ exterioris lobi* ¼ lin. longi, ½ lin. lati, interioris lobi 1–1¼ lin. longi.

373. **Pergularia africana**, *N. E. Brown;* volubilis, glabra, foliis ovato-oblongis vel late ovatis breviter, cuspidatis apice obtusis basi rotundatis cordatis vel cuneatis glabris vel supra parce puberulis, umbellis lateralibus pedunculatis vel subsessilibus multifloris, pedicellis sepalisque lanceolatis vel ovatis acutis glabris, corollæ hypocrateriformis tubo basi inflato fauce dense villoso lobis linearibus obtusis intus breviter villosis, coronæ lobis elliptico-lanceolatis orbiculari-obovatis vel obovato-oblongis obtusis vel subacutis intus ligula lineari vel lanceolato-attenuata acuta instructis.

Habitat.—Lagos, *Rowland.* Niger Territory: Nupe and Ifaye, *Barter*, 3332; Old Calabar, *Thomson.* Sierra Leone, *Elliot*, 4589, 5498, 5553. Natal, *McKen*, 2, *Wood*, 3395.

Folorium petioli 4 lin.—3 poll. longi, laminæ 2–4 poll. longæ, 1–3 poll. latæ. *Pedunculi* 0–5 lin. longi. *Pedicelli* 2–3 lin. longi. *Sepala* 1¼–2 lin. longa. *Corollæ tubus* 3–4 lin. longus, lobi 3½–6 lin. longi, ¾ lin. lati. *Coronæ lobi* 1–1¾ lin. longi, ligula 1 lin. longa.

374. **Fockea Schinzii**, *N. E. Brown;* volubilis, foliis hysteranthiis, cymis axillaribus multifloris compactis tomentosis, sepalis ovatis acutis, corollæ lobis anguste oblongis obtusis marginibus revolutis extus glabris intus puberulis, corona tubulosa, inæqualiter 10–dentata intus paribus 5 dentium instructa dentibus cuiusque paris superpositis.

Habitat.—Angola, *Welwitsch*, 4194. Amboland; Ombandja, *Schinz.*

Pedicelli 2–5 lin. longi. *Sepala* 1–1¼ lin. longa. *Corollæ tubus* 1 lin. longus, lobi 3½–4 lin. longi. *Corona* 2 lin. longa.

375. **Fockea undulata,** *N. E. Brown;* caule basi ramoso ramis brevibus puberulis, foliis sessilibus linearibus apice revoluto-uncinatis acutis marginibus undulato-revolutis supra minute puberulis subtus glabris, floribus paucis axillaribus fasciculatis pedicellatis, pedicellis sepalisque lanceolato-deltoideis acutis puberulis, corollæ campanulatæ lobis lineari-oblongis obtusis extus puberulis, coronæ tubulosæ 10–lobatæ lobis trifidis alternis minoribus interdum subintegris dentibus filiformibus lateralibus multo minoribus, tubo intus 15–carinato carinis intermediis validis in dentes 5 filiformes quam tubo sublongiores excurrentibus.

Habitat.—Transvaal; Rhenoster Kop, *Burke.*

Rami $1\frac{1}{4}$–3 poll. longi. *Folia* 1–$1\frac{1}{2}$ poll. longa, $\frac{3}{4}$–1 lin. lata. *Pedicelli* 1 lin. longi. *Sepala* $\frac{3}{4}$–1 lin. longa. *Corollæ tubus* 1 lin. longus, lobi 2–$2\frac{1}{4}$ lin. longi, $\frac{3}{4}$ lin. lati. *Coronæ tubus* $1\frac{1}{2}$–$1\frac{2}{3}$ lin. longus, dentes longiores $1\frac{1}{2}$ lin. longi.

376. **Riocreuxia profusa,** *N. E. Brown;* foliis petiolatis ovatis vel elliptico-ovatis breviter cuspidatis acutis basi cordatis supra glabris subtus venis pubescentibus, cymis magnis glabris, cymulis 3–4-floris, sepalis lanceolatis acuminatis glabris, corollæ tubo basi leviter inflato utrinque glabro lobis lineari-lanceolatis apice connatis glabris, coronæ exterioris lobis subrectangularibus bifidis, coronæ interioris lobis linearibus acutis truncatis vel bifidis conniventibus.

Habitat.—Nyassaland, Shire Highlands, *Buchanan*, 205, 455.

Foliorum petioli 1–$2\frac{1}{2}$ poll. longi, laminæ $2\frac{1}{2}$–$5\frac{1}{2}$ poll. longæ, $1\frac{1}{2}$–4 poll. latæ. *Cymæ rami* $\frac{1}{2}$–7 poll. longi. *Pedicelli* $\frac{3}{4}$–$1\frac{1}{2}$ poll. longi. *Sepala* $1\frac{1}{2}$ lin. longa. *Corolla* 7–$8\frac{1}{2}$ lin. longa. *Coronæ exterioris interiorisque lobi* $\frac{1}{2}$ lin. longi.

377. **Ceropegia constricta,** *N. E. Brown*; caule volubili glabro, foliis ovatis vel ellipticis subabrupte acutis mucronatis basi late cuneatis setuloso-denticulatis glabris, pedunculis 2–3-floris, sepalis lanceolato-acuminatis glabris, corollæ tubo curvato parte inflata medio constricta apice infundibulariformi extus glabro intus in fauce hirto, lobis apice connatis deltoideo-ovatis replicatis intus carinatis hirtis et ciliatis, coronæ exterioris lobis minutis bursæformibus, interioris lobis lineari-subulatis apice connatis basi carinatis.

Habitat.—Tanganyika, *Carson*, 35.

Foliorum petioli, 3–4 lin. longi, laminæ 9–15 lin. longæ, 5–10 lin. latæ. *Pedunculi* 9–15 lin. longi. *Pedicelli* 3–5 lin. longi. *Sepala* 2 lin. longa. *Corollæ tubus* $1\frac{1}{4}$ poll. longus, lobi 4–6 lin. longi. *Coronæ interioris lobi* $1\frac{1}{3}$ lin. longi.

378. **Ceropegia subtruncata,** *N. E. Brown;* caule volubili unifariam pubescente, foliis petiolatis ovatis vel oblongo-obovatis subcuspidato-acuminatis subtus pilosis ciliatis, floribus solitariis pedicellatis, sepalis lanceolato-attenuatis parce pubescentibus, corollæ tubo curvato glabro basi leviter inflato limbo subtruncato apiculato lobis late rhomboideis replicatis apice connatis glabris, coronæ exterioris lobis profunde bifidis, interioris lobis linearibus acutis erecto-conniventibus.

Habitat.—Abyssinia, *Schimper*, 628.

Foliorum petioli 6–9 lin. longi, laminæ $1\frac{3}{4}$–$3\frac{1}{2}$ poll. longæ, 1–$1\frac{3}{4}$ poll. latæ. *Pedicelli* 7–9 lin. longi. *Corollæ tubus* 9 lin longus, lobi 5 lin. longi. *Coronæ exterioris lobi* $\frac{3}{4}$ lin. longi, interioris lobi $1\frac{1}{2}$ lin. longi.

379. **Ceropegia nigra**, *N. E. Brown;* caule volubili pubescente, foliis petiolatis ovatis vel elliptico-ovatis acutis vel acuminatis basi cordatis vel late rotundatis pubescentibus, cymis subsessilibus plurifloris, sepalis subulatis pubescentibus, corollæ tubo curvato basi inflato apice infundibuliformi extus pubescente intus glabro, lobis liberis patentibus deltoideo-ovatis obtusis marginibus recurvis intus glabris nigris, coronæ exterioris lobis rectangularibus bifidis, interioris lobis filiformibus erectis apice incurvis penicillatis.

Habitat.—Niger territory, *Baikie.*

Foliorum petioli 4–6 lin. longi, laminæ 9–16 lin. longæ, 6–12 lin. latæ. *Pedicelli* 4–6 lin. longi. *Sepala* 1½–2 lin. longa. *Corollæ tubus* 6 lin. longus, lobi 2½ lin. longi, 1½ lin. lati. *Coronæ exterioris lobi* ⅕ lin. longi, interioris lobi 1¼ lin. longi.

380. **Ceropegia tentaculata**, *N. E. Brown;* caule volubili glabro, foliis petiolatis succulentis linearibus oblongis ovatis ovato-lanceolatis vel spathulato-obovatis acutis vel obtusis mucronulatis basi cuneato-acutis vel rotundatis glabris, umbellis sessilibus 1-multifloris, sepalis lanceolatis acutis glabris, corollæ tubo recto vel leviter curvato basi inflato apice leviter ampliato extus glabro, lobis liberis patentibus e basi deltoidea in apicem capillarem attenuatis, coronæ exterioris lobis minutis bursæformibus, interioris lobis erectis lineari-spathulatis.

Habitat.—Angola: Loanda, *Welwitsch*, 4277. Amboland: Omatope and Ondonga, *Schinz.*

Foliorum petioli 1–3 lin. longi, laminæ 9 lin.-2 poll. longæ, 1½–15 lin. latæ. *Pedicelli* 3–5 lin. longi. *Sepala* 1 lin. longa. *Corollæ tubus* 7–9 lin. longus, lobi 5–6 lin. longi. *Coronæ interioris lobi* ½ lin. longi.

381. **Ceropegia sobolifera**, *N. E. Brown;* caule volubili unifariam pubescente, foliis petiolatis lanceolatis acuminatis subtus pubescentibus ciliatis, floribus binis pedicellatis, sepalis oblongo-lanceolatis acutis glabris, corollæ tubo vix curvato subcylindrico vix inflato glabro, lobis incurvatis apice connatis replicatis intus carinatis glabris, coronæ exterioris lobis profunde bifidis ciliatis, interioris lobis linearibus erecto-conniventibus.

Habitat.—Abyssinia, *Schimper*, 463.

Foliorum petioli 2–3 lin. longi, laminæ 8–12 lin. longæ, 2–4 lin. latæ. *Pedicelli* 3–4 lin. longi. *Sepala* 1½ lin. longa. *Corolla tubus* 7–8 lin. longus, lobi 4 lin. longi. *Coronæ exterioris lobi* ¾ lin. longi, interioris lobi 1 lin. longi.

382. **Ceropegia volubilis**, *N. E. Brown;* caule volubili glabro, foliis petiolatis cordato-ovatis acuminatis mucronatis glabris ciliolatis, pedunculis glabris 2–4-floris, sepalis subulatis, corollæ tubo curvato basi inflato glabro, lobis deltoideo-oblongis erectis replicatis apice connatis superne ciliatis, corona exteriore 10-dentata ciliata, coronæ interioris lobis linearibus erectis.

Habitat.—Angola, *Welwitsch*, 4272.

Foliorum petioli 4½–9 lin. longi, laminæ 1½–2 poll. longæ, 7½–17 lin. latæ. *Pedunculi* 2–5 lin. longi. *Pedicelli* 3–4 lin. longi. *Sepala* 1½ lin. longa. *Corollæ tubus* 6–7½ lin. longus, lobi 3 lin. longi. *Coronæ exterioris dentes* ½ lin. longi, interioris lobi 1 lin. longi.

383. **Ceropegia angusta**, *N. E. Brown;* volubilis, glabra, foliis petiolatis lineari-lanceolatis acutis vel obtusis mucronulatis, basi rotundatis

subpeltatis, pedunculis 1–2-floris, floribus subdistantibus, sepalis lanceolatis attenuatis, corollæ tubo recto basi inflato extus papillato-ruguloso intus glabro, lobis conniventibus apice connatis replicatis intus carinatis carinis ciliatis, corona exteriore 10-dentata ciliata, coronæ interioris lobis linearibus connivento-erectis.

Habitat.—Angola, *Welwitsch*, 4276.

Foliorum petioli 2–3 lin. longi, laminæ 1-$2\frac{1}{4}$ poll. longæ, $1\frac{3}{4}$–3 lin. latæ. *Pedunculi* 3–5 lin. longi. *Pedicelli* $2\frac{1}{2}$–3 lin. longi. *Sepala* $1\frac{1}{4}$ lin. longa. *Corollæ tubus* $4\frac{1}{2}$–5 lin. longus, lobi 2 lin. longi. *Coronæ exterioris dentes* $\frac{1}{2}$ lin. longi, interioris lobi $\frac{3}{4}$ lin. longi.

384. **Ceropegia distincta,** *N. E. Brown;* volubilis, glabra, foliis ovato-oblongis vel late elliptico-ovatis breviter cuspidato-acutis vel acutis basi breviter cordatis, pedunculis 1–2-floris, sepalis linearibus vel subulatis acutis, corollæ tubo curvato basi inflato apice infundibuliformi, lobis inflexis et in tubum brevem angustum connatis deinde in capitulum pentagonum dilatatis, coronæ interioris lobis erectis lineari-spathulatis obtusis.

Habitat.—Zanzibar, *Kirk*, 28.

Foliorum petioli 5–8 lin. longi, laminæ 2–3 poll. longæ, 1–2 poll latæ. *Pedunculi* 1–$1\frac{1}{2}$ poll. longi. *Pedicelli* 4–8 lin. longi. *Sepala* 5–6 lin. longa. *Corollæ tubus* circa 1 poll. longus, lobi circa 6 lin. longi. *Coronæ interioris lobi* $1\frac{1}{2}$ lin. longi.

385. **Ceropegia scandens,** *N. E. Brown;* volubilis glabra, foliis petiolatis ovatis oblongo-ovatis vel elliptico-ovatis acuminatis basi rotundatis vel emarginatis, pedunculis 4–7-floris, sepalis subulatis apice revolutis, corollæ tubo curvato basi leviter inflato, lobis erectis apice connatis oblongo-ovatis replicatis ciliatis intus carinatis, coronæ exterioris lobis bifidis ciliatis, interioris lobis erectis linearibus subacutis.

Habitat.—Angola, *Welwitsch*, 4273.

Foliorum petioli 6-9 lin. longi, laminæ 2–$3\frac{1}{4}$ poll. longæ, $1\frac{1}{4}$–$1\frac{1}{2}$ poll. latæ. *Pedunculi* 1 poll. longi. *Pedicelli* 5 lin. longi. *Sepala* $2\frac{1}{2}$–3 lin. longa. *Corollæ tubus* circa 6 lin. longus, lobi circa 5 lin. longi. *Coronæ exterioris lobi* $\frac{1}{4}$ lin. longi, interioris lobi $\frac{3}{4}$ lin. longi.

386. **Ceropegia racemosa,** *N. E. Brown;* caule volubili glabro, foliis petiolatis lanceolatis vel oblongo-lanceolatis acutis vel obtusis apiculatis basi rotundatis marginibus scaberulis, racemis 2–4-floris, floribus distantibus, sepalis ovato-lanceolatis acutis glabris, corollæ tubo recto cylindrico basi obliquo apice late infundibulariformi extus glabro intus villoso, lobis erecto-conniventibus apice connatis linearibus basi dilatatis replicatis plicis ciliatis, corona exeriore 10-dentata ciliata, coronæ interioris lobis linearibus erecto-conniventibus apice revolutis.

Habitat.—Jur: Ghattas, *Schweinfurth*, 2105.

Foliorum petioli $1\frac{1}{2}$–3 lin. longi, laminæ $1\frac{1}{4}$–2 poll. longæ, 4–9 lin. latæ. *Pedunculi* $1\frac{1}{2}$–4 poll. longi. *Pedicelli* $2\frac{1}{2}$–3 lin. longi. *Sepala* $1\frac{1}{2}$ lin. longa. *Corollæ tubus* circa 9 lin. longus, lobi 7 lin. longi. *Coronæ exterioris dentes* $\frac{1}{2}$ lin. longi, interioris lobi 1 lin. longi.

387. **Ceropegia medoensis,** *N. E. Brown;* caule erecto molliter pubescente, foliis brevissime petiolatis ovatis vel oblongis obtusis vel subacutis breviter pilosis, floribus 1–2 terminalibus, sepalis lanceolato-subulatis pubescentibus, corollæ tubo recto basi inflato apice anguste

infundibuliformi extus parce pubescente, lobis elliptico-spathulatis intus carinatis apice in conum brevem latum vel umbraculum connatis glabris, corona exteriore campanulata 10-dentata, coronæ interioris lobis erectis subulatis.

Habitat.—Medo country, between Lagenda River and Ibo, *Last.*

Foliorum petioli ½–1 lin. longi, laminæ 1–1½ poll. longæ, 3–10 lin. latæ. *Pedicelli* 2–4 lin. longi. *Sepala* 3 lin. longa. *Corollæ tubus* 1½ poll. longus, lobi 1 poll. longi, 5–6 lin. lati. *Coronæ exterioris dentes* 1¼ lin. longi, interioris lobi 1 lin. longi.

388. **Brachystelma Buchanani,** *N. E. Brown;* caule erecto puberulo, foliis brevissime petiolatis elliptico-obovatis obtusissimis basi cuneatis pubescentibus, umbellis 5–7-floris in cymam terminalem dispositis, sepalis lanceolatis acuminatis pubescentibus, corollæ patelliformis lobis triangularibus acutis glabris, corona exteriore cupulari 10-dentata, dentibus deltoideo-subulatis retrorsim pubescentibus patentibus, coronæ interioris lobis lineari-oblongis super antheras incumbentibus.

Habitat.—Nyassaland: Shire Highlands, *Buchanan*, 116.

Folia 3½–4½ poll. longa, 2–2½ poll. lata. *Pedicelli*, 1 poll. longi. *Sepala* 1¾–3 lin. longa. *Corolla* 9 lin. diam. *Coronæ exteriores dentes* ½ lin. longi, interioris lobi ½ lin. longi.

389 **Brachystelma magicum,** *N. E. Brown;* foliis oblanceolato-oblongis subobtusis basi cuneatis utrinque pubescentibus, sepalis lanceolato-attenuatis, corollæ rotatæ lobis brevibus deltoideis glabris, corona exteriore 10-dentata dentibus subulatis erectis, coronæ interioris lobis linearibus super antheras incumbentibus.

Habitat.—"Collected a long day's journey this side of Ujiji" by the Belgian Consul at Zanzibar in 1884.

Folium 3½ poll. longum, 13½ lin. latum. *Pedicellus* 1 poll. longus. *Sepala* 3 lin. longa. *Corolla* 1 poll. diam. *Coronæ exterioris dentes* 1 lin. longi, interioris lobi ½–⅔ lin. longi.

Of this very distinct species I have only seen a single leaf and a flower, but probably it is a large species allied to *B. Buchanani*, N. E. Br.

390. **Echidnopsis nubica,** *N. E. Brown; E. cereiformi* similis, sepalis lanceolatis acutis minute papillatis, corolla campanulato-rotata lobis ovatis acutis extus minute papillatis, corona exteriore nulla, coronæ interioris lobis deltoideo-ovatis.

Habitat.—Nubia: between Suakin and Berber, *Schweinfurth*, 228.

Sepala ½–¾ lin. longa. *Corolla* 2 lin. diam., lobis ½–¾ lin. longis. *Coronæ interioris lobi* ¼ lin. longi.

391. **Caralluma Sprengeri,** *N. E. Brown;* caulibus quadrangulatis grosse dentatis glabris, cymis sessilibus 5–6 floris, pedicellis brevibus glabris, sepalis lanceolatis acuminatis, corolla rotata lobis ovatis acuminatis intus papillato puberulis olivaceis, corona exteriore annulari obscure crenulata, coronæ interioris lobis ovato-oblongis obtusis coronæ exteriori dorso adnatis super antheræ incumbentibus et eas subæquantibus. *Huernia Sprengeri*, Schweinfurth *ex Damman Cat.* 1893, p. 46; *Wiener Illust. Gartenzeit*, 1893, p. 143; Schumann in *Monatsschr. für Kakteenkunde*, 1893, III., pp. 74 and 104.

Habitat.—Abyssinia: Adow, *Petit*; Massowah? *Schweinfurth.*

Caules 2½–5 poll. longi, ½–¾ poll. crassi. *Pedicelli* 1½ lin. longi. *Sepala* 1½–2 lin. longa. *Corolla* 10–11 lin. diam., lobis 4–5 lin. longis, 2½–2¾ lin. diam.

392. **Caralluma hirtiflora**, *N. E. Brown*; similis *C. retrospicienti*, sed floribus duplo majoribus, pedicellis glabris, sepalis lanceolato-attenuatis, corolla rotata lobis deltoideo-ovatis acutis intus dense hirsutis, corona exteriore cupulari 10-dentata breviter hirta dentibus subulatis, coronæ interioris lobis linearibus quam antheræ longioribus glabris cum corona exteriore dorso partitionibus angustis connexis.

Habitat.—Hanish Island, in the Red Sea, *Slade*, 20.

Pedicelli 1 poll. vel ultra longi. *Sepala* 1½–2 lin. longa. *Corolla* 1¼ poll. vel ultra diam., lobis 4–5 lin. longis, 4–4½ lin. latis. *Coronæ exterioris dentes* 1 lin. longi, interioris lobi ⅓ lin. longi.

393. **Caralluma somalica**, *N. E. Brown*; caulibus probabiliter acute 4-angulatis glabris angulis breviter dentatis, umbellis terminalibus globosis multifloris, pedicellis glabris, sepalis lanceolato-attenuatis parcissime pubescentibus, corollæ tubo breviter campanulato lobis patentibus deltoideo-ovatis acutis intus microscopice velutinis non ciliatis, coronæ exterioris lobis deltoideo-oblongis apice bidentatis dorso parce et minute hirtis dentibus subulatis divergentibus basi distantibus interdum denticulo intermedio instructis, coronæ interioris lobis linearibus antheras subæquantibus.

Habitat.—Somaliland: near Magadoxo, *Kirk.*

Pedicelli 6–8 lin. longi. *Sepala* 1½–2 lin. longa. *Corolla* 6–7 lin. diam., lobis 2½ lin. longis, 2 lin. latis. *Coronæ exterioris lobi* cum dentibus 1 lin. longi, interioris lobi ⅓ lin. longi.

394. **Caralluma valida**, *N. E. Brown*; caulibus probabiliter 4-angulatis grosse dentatis glabris, pedicellis cum sepalis ovato-lanceolatis acuminatis glabris, corolla profunde lobata lobis elongato-deltoideis acutis rugosis ciliatis, coronæ exterioris lobis oblongo-lanceolatis acutis 2–3 carinatis lateribus breviter unidentatis, coronæ interioris lobis late linearibus bifidis erecto-conniventibus basi cristatis.

Habitat.—Locality uncertain, collected by *Dr. Holub* either in the Zambesi region or the Transvaal.

Caules 4 poll. vel ultra longi, 7–10 lin. crassi. *Pedicelli* 4–5 lin. longi. *Sepala* 3½ lin. longa. *Corollæ lobi* 8–9 lin. longi 2½ lin. lati. *Coronæ exterioris lobi* 1¼ lin. longi, interioris lobi 1½ lin. longi.

395. **Trichocaulon officinale**, *N. E. Brown*; caulibus iis *T. piliferi* similibus, corolla rotato-campanulata fusco-purpurea tubo nullo lobis deltoideo-ovatis subabrupte acuminatis, coronæ exterioris lobis brevibus emarginatis vel profunde bifidis coronæ interioris lobis lineari-oblongis brevibus adnatis.

Habitat.—Bechuanaland.

Pedicelli 1 lin. longi. *Sepala* 1¼ lin. longa. *Corolla* circa 5 lin. diam., lobis 2–2⅓ lin. longis, 2 lin. latis. *Coronæ exterioris lobi* ½ lin. longi, interioris lobi ⅓ lin. longi.

Dried slices of this plant were, a few years ago, imported into America as a remedy for piles; from some of these slices, presented to the Kew Herbarium by Mr. E. M. Holmes of the Pharmaceutical Society, I have made the above diagnosis.

396. **Hoodia parviflora,** *N. E. Brown;* caulibus iis *H. Gordoni* similibus, pedicellis brevibus glabris, sepalis ovato-lanceolatis glabris, corolla concava obscure 5-loba lobis apice subulato-apiculatis extus glabris intus pubescentibus, coronæ exterioris lobis bifidis concavis, coronæ interioris lobis linearibus obtusis quam antheræ brevioribus coronæ exteriori dorso adnatis.

Habitat.—Angola, *Welwitsch*, 4265.

Pedicelli 1–2 lin. longi. *Sepala* 2½ lin. longa. *Corolla* circa 1¼ poll. diam. *Coronæ exterioris lobi* ½ lin. longi.

397. **Duvalia dentata,** *N. E. Brown;* caulibus 6-angularibus glabris angulis longe dentatis dentibus subulato-attenuatis, cymis paucifloris, pedicellis et sepalis lanceolato-attenuatis glabris, corollæ annulo pentagono puberulo lobis elongato-deltoideis acuminatis replicatis ciliatis, corona exteriore plana pentagona, coronæ interioris lobis rhomboideo-ovoideis acutis.

Habitat.—Bechuanaland: 30 miles N.W. of Koobie, *Baines.*

Planta circa 4 poll. alta. *Pedicelli* 8–12 lin. longi. *Sepala* 3 lin. longa. *Corollæ lobi* 6–7 lin. longi, 4 lin. lati.

398. **Huernia similis,** *N. E. Brown;* caulibus elongatis obtuse 5–(6?)-angulatis glabris angulis brevissime dentatis, cymis 3–5-floris, pedicellis sepalisque lanceolato-acuminatis glabris, corolla late campanulata intus papilloso-aspera lobis deltoideis acuminatis, coronæ exterioris lobis minutis obtusis interioris lobis linearibus obtusis adscendentibus basi transverse carinatis.

Habitat.—Angola, *Welwitsch*, 4264.

Caules usque ad 9 poll. longi, circa 6 lin. crassi, dentes ½ lin. longi. *Pedicelli* 6–9 lin. longi. *Sepala* 2 lin. longa. *Corolla* circa 7–8 lin. diam. *Coronæ exterioris lobi* ¼–⅓ lin. longi et lati, coronæ interioris lobi ½–⅔ lin. longi.

399. **Huernia arabica,** *N. E. Brown;* caulibus 4-angulatis glabris angulis subulato-dentatis, pedicellis cum sepalis attenuato-subulatis glabris, corolla campanulata intus papilloso-scabrida lobis deltoideis acuminatis, coronæ exterioris lobis quadratis truncatis, interioris lobis e basi gradatim angustatis quam antheræ subduplo longioribus.

Habitat.—Arabia: Hille Gebel Bura, *Schweinfurth*, 374.

Caules 2–3½ poll. longi, probabiliter 5–6 lin. crassi. *Pedicelli* 3 lin. longi. *Sepala* 4 lin. longi. *Corolla* circa 7 lin. diam., lobis 3 lin. longis. *Coronæ exterioris lobi* ½ lin. longi, ⅔ lin. lati, interioris lobi ⅔ lin. longi.

400. **Stapelia vaga,** *N. E. Brown;* affinis *S. gemmifloræ*, Mass., pedicellis et sepalis ovato-lanceolatis acuminatis glabris, corollæ rotatæ lobis oblongo-lanceolatis acutis rugulosis ciliatis fusco-purpureis, coronæ exterioris lobis oblongis 4-dentatis, interioris lobis inæqualiter bicornutis cornibus subulatis.

Habitat.—Amboland: Olukonda, *Schinz.*

Pedicelli 1½–2 poll. longi. *Sepala* 3½ lin. longi. *Corolla* 2½ poll. vel ultra diam., lobis 1 poll. vel ultra longis, circa 5 lin. latis. *Coronæ exterioris lobi* 1½–1¾ lin. longi, interioris lobi 1½ lin. longi.

CCCCLXXX.—CITRUS FRUITS IN SICILY.

The orange industry in Florida was of the annual value of nearly a million sterling. As already described in the *Kew Bulletin*, 1895, pp. 125 and 166, this important industry, largely supported by British capital and energy, has practically ceased to exist. This circumstance has given rise to a possible revival of orange-growing in Jamaica and the Bahamas, which formerly supplied a good deal of the oranges consumed in the United States.

The chief seat of the orange industry in the Mediterranean is at Palermo in Sicily. In reply to many inquiries addressed to him on the subject, Mr. H. Lewis Dupuis, Her Majesty's Consul at Palermo, has prepared what may be regarded as an exhaustive account of the orange and lemon industry. This is published in a Foreign Office Report (Annual Series, 1895, No. 1544). From this report the following extracts are reproduced:—

COMMERCE IN ORANGES AND LEMONS (*Green Fruit.*)

So-called from their being gathered when yet green, in order to stand the voyage. Both oranges and lemons grow abundantly in the provinces of Palermo, Messina, Catania, and Syracuse; Messina is especially noted for lemons. The best oranges are those grown in the province of Catania, especially at Adernò and Biancavilla, but very many excellent and mixed qualities are found in the province of Palmero. They are distinguished as ordinary, blood, and sweet or vanilla, and mandarins. Lemons present no variety although they have designations known to the trade. Shipments mostly go to the States. In the last 3 years the numbers of boxes exported to the States alone were as follows:—

1892–93.

——	New York.	Boston.	Philadelphia.	New Orleans.	Baltimore.
	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.
Oranges - -	326,020	168,759	48,689	21,796	10,532
Lemons - -	100,423	235,186	117,353	252,722	576,752

1893–94.

——	New York.	Boston.	Philadelphia.	New Orleans.	Baltimore.
	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.
Oranges - -	245,217	116,029	46 255	10,062	12,318
Lemons - -	798,016	149,601	92,309	135,900	19,818

NOTE.—This would represent the value of 74,800*l.*

The wood for the construction of these boxes is imported from Trieste, Fiume, and Bangor, United States of America, and made up here into cases, boxes, and half-boxes. The quantities sent to the United Kingdom are comparately small :—

—	Oranges.	Lemons.	Weight (about).	In Centimetres.		
				Length.	Depth.	Breadth.
	Number.	Number.	Lbs.			
Half boxes	80 to 180	—	44 55 66	70	18 or 25	35
Boxes	160 360	240 to 490	88	70	27 29	35
Cases	420 490	240 490	132	70 or 80	30	33

Boxes and cases are spoken of as 16, 25, 30, 36, 42, 49, &c., according to the number of oranges or lemons in each layer. The fruit that goes to the United Kingdom is in cases, and that for the United States in boxes and half-boxes. They are carefully stowed in tiers, one above the other, in the vessel's hold, in such a way as to prevent injury to the fruit. Half-boxes only contain two layers of fruit. Boxes, four and sometimes five. All, whether oranges or lemons, are wrapped in tissue paper, with paper shavings to fill up interstices, and ripen on the voyage. Naturally this fruit can never be as good as that which ripens on the tree. During the last few years fears have been entertained that this trade to the States will eventually suffer considerably on account of suitableness found in the climate and soil of Florida and California, where the trees have been extensively introduced. It follows that if the States can produce their home supplies there will be little or no demand for fruit from here, and with their system of railways, their markets will be supplied with fresh fruit which has not run the risk of deteriorating on a long sea voyage. Unfortunately, the orange crop in Florida was destroyed by the exceptionally severe cold experienced in December last. This will occasion an advance of prices in the States the effect of which will be to stimulate the trade in Sicily in 1895.

The growth of this trade has only been developed within the last 40 years, and since the introduction of steam it is four times or more as great as it was in the days of sailing craft. Commensurate with this increasing demand and prompt disposal of cargoes, the value of fruit in this country has been enhanced, and this consideration, in the words of my report of 1893, induced growers to raise their prices, and there followed temporarily a marked decrease in the demand. Fruit then was shipped at exporter's risk and this failed to answer, agents were sent over to the States to safeguard exporters' interests as it was thought, but even this measure was ineffectual, for it was found that the former induced shippers who had not their own agents in the country to send their supplies to them, under promise of greater facilities, &c. In this emergency the questionable system of money advances to shippers sprang up, in order to secure shipments, and fruit began to be put on board unfit to stand the voyage.

Shipowners, in some cases, are known to have entered into contracts with shippers for certain supplies to be put on board their vessels during the fruit season in consideration of this advance to be accounted for on settlement of freight.

CULTIVATION OF ORANGE AND LEMON TREES.

The following practical notes regarding the cultivation of orange and lemon trees, it is hoped, will answer the many inquiries addressed to me. The fruit is one of the chief articles of trade in Sicily. In some parts of the Island they are a source of wealth to the proprietor and afford work to thousands of men, women and children in cultivating the tree and in gathering and packing the fruit for exportation. Besides there is work in the production of essences whether of orange, lemon, mandarin, or bergamot, and concentrated lemon juice, the latter is carried on on a large scale. Vice-Consul Elford, who furnishes me with all particulars, correctly observes that the lemon is the most productive as well as the most remunerative of the class and gives the largest return per acre of land planted. The trees are set about 5 yards distant one from the other in rows and equidistant. Stony or sandy soil is apparently the best suited, for the best groves are near the beds of torrents or on the coast line from Messina to Acircale for instance, and from Milazzo to Messina and in the neighbourhood of Palermo. They will not thrive in a stiff soil such as clay, for the roots are superficial and abundant. The trees have to be well manured at least once a year, and the way is to dig a trench, say about 40 inches from the stem and bury the manure 18 inches below. Ripe stable mixed with wood ash and bone is said to yield the best and fetches the highest price. Mr. Elford points out that the blossoms of April produce the best fruit, known as primo-flore (choice fruit), which is gathered in October, and those of May yielding a second crop, gathered in November and December, these are the best crops as well as the most abundant, and upon them the proprietors base all their calculations. The blossoms of June produce fruit gathered in January and February, those of July generally fall off and little heed is taken of them, those of August are gathered in March, those of September produce a better fruit, gathered in April and May; the fruit of those of October, November, and December are known as bastards and are gathered in June, July, August, and September, whilst those of January, February, and March yield little fruit, which falls under the same denomination.

FIRST CROPS.

The first gathering occurs in October, care being taken that the lemons be not less than 3 inches in circumference; all under are left for the November gathering. Practised hands gauge the fruit with thumb and second finger. The first crop (the most valuable) is carefully selected, packed, and shipped off for early spring or summer use, and realises 30 per cent. more than any subsequent gathering; no time, therefore, is lost in sending it off as early as possible, in order to get the highest price. As I have already observed they are packed in various sized cases to suit the different markets Those for France are of one size, those for London of another. Each case contains about 450 lemons. For the States and Trieste boxes are used, containing only about 360. All that are considered inferior are put in small cases for the Italian market, and fetch 40 per cent. less.

SECOND CROPS.

The second gathering takes place in November, and is as good as that of October, and will keep for months in boxes if properly selected and packed; it is paler in colour, and harder to the touch. It is, therefore, often kept in cases until March, then repacked, and keeps good for a reasonable time. This chiefly goes to the States and Russia. All small or damaged fruit, which must not be left on the tree, is collected and used for making essence from the peel, and concentrated juice from the pulp. The custom is to calculate 104 kilos. of this inferior fruit as equivalent to 1000 lemons, and charge 30 per cent. less than for the good box fruits.

EXTRACTING ESSENCE AND LEMON JUICE.

It costs about 1*s*. 4*d*. to extract the essence of 1000 lemons, and 4*l*. to make a cask of lemon-juice, including fruit, cost of cask, and labour.

Of all inferior fruit, that gathered in November is considered the best for the making of essence and lime-juice, because it contains more valuable properties, yielding 50 per cent. more than that of other months. 1000 of these give about 16 ozs. of essence, and 35 litres of raw lemon-juice, which after concentration to the normal standard of 64 ozs. of citric acid per imperial gallon is reduced to 3½ litres. On a well cultivated plantation results show that seven-eighths of November fruit is good for shipment, and only one-eighth for essence and lime-juice.

The fruit gathered in December is considered inferior, as only five-eighths is fit for exportation, and three-eighths go for making essence and lime-juice. It is packed in small cases for the States, Southern Russia, and Trieste, and is worth about 15 per cent. less than the same sized cases of November fruit. Also the per-centage of essence is about 15 ozs. less per 1000, and the juice about 14 litres more. After the juice is expressed the residue is given to the goats.

The January fruit, again, is inferior to that of December, only three-eighths being fit for packing; the rest is used for juice and essence. This fruit is perfectly yellow. Such as is fit for exportation is packed in boxes, the same as that of December; that which is not is cut and pickled in casks with salt, and then exported. Each cask contains about 3400 lemons.

February's fruit is the last of the season; it is also called the "old fruit," because the remains of previous gatherings. Nothing is now left on the tree except the green fruit of the August blossom. Of this crop only two-eighths can be packed for shipment, which on arrival have to be sold at once, as they will not keep. The remainder are used for essence, juice, and pickling, and yield about 12 ozs. of essence and about 42 litres of raw lemon-juice.

EXTRA CROPS.

The so-called extraordinary crops depend upon the mode of cultivation, and also climatic influences. Irrigation also enters largely in bringing it about. If a tree be deprived of irrigation during the hot months of July and August, and then abundantly watered in September, a spurt is put on producing an extraordinary amount of blossom which results in the valuable May crop. This cannot be done every year, for the tree suffers from the privation alluded to, and subsequent fruit is retarded in its development. Yet when the demand for May fruit is great, and prices range from 30*s*. to 40*s*. per 1000, it is done, as these prices compensate for any loss in September and October.

The March crop, known as "biancuzzi," and which is the result of the August blossoming, is the least valuable, for it will not stand a long voyage. It is sent to Trieste in small cases. Neither does it yield essence nor juice. Prices average about 40 per cent. less than those obtained for good lemons.

The April yield from the September blossom is not much better than that of March, yet some good fruit may be picked out for packing, but nearly all is used for local purposes.

The May yield, which is also the result of the September blossom, known as "verdelli," is much sought after, and is shipped to the States in small cases; the fruit is of excellent keeping quality, and easily stands the voyage. No care is necessary in gathering or sorting the fruit, as it is all good, worth 25 per cent. more than winter-grown fruit.

The so-called "bastardi" are gathered in June and July, and are the result of October and November blossoming. They are packed in similar cases, and are sent to London, Liverpool, Trieste, and the States.

In August and September the lemon crop is smaller, and inferior to those of the previous months. It realises less on this account, and also because the lemon crop in South Spain begins.

PRODUCTION OF AVERAGE PLANTATION.

The following is a fair proportion of the divers kinds of lemons grown on a plantation of average size, which produces, we will say, 110,000 annually:—

Month.		Number of Lemons gathered.
October - - -	(about)	15,000
November - - -	,,	30,000
December - - -	,,	25,000
January - - -	,,	20,000
February - - -	,,	10,000
March - - -	,,	1,000
April–September - -	,,	9,000

The last is only approximate, because it depends on whether the trees have been forced or not.

PACKING.

Cost of packing varies according to size of case:—

——	Large.	Small.
	s. *d.*	*s.* *d.*
Cost of case - - -	0 9	0 6
,, paper - - -	0 6	0 4
,, gathering and packing -	0 4	0 3
Nails and hoops - -	0 1	0 1
Total - - -	1 8	1 2

LEMON PLANTATIONS.

The management of a lemon plantation demands great attention. Trees should be trained high to admit free ventilation, pruning to take place regularly once a year. Dead wood, unhealthy and redundant branches removed. In cases of a heavy crop, the branches are to be supported. Trees to be watered in summer with a little liquid manure in the water once a week, and the ground kept free from all undergrowth. Market gardening is occasionally practised between the trees, because the vegetables grown pay expenses for manure and cultivation; but it is not to be recommended, as the fruit suffers in consequence.

The tree should always be grafted on the bitter orange; if grown from the pip it is subject to a disease called the gum, which often destroys it. Grafting takes place after three years, and is practised in the same way as on the rose tree.

Vice-Consul Pignatorre also furnishes me with additional particulars on the subject. The tree requires [in Sicily] an equal temperature. Lands bordering on the coastline are the most favourable, provided the situation be a sheltered one, as the trees are very susceptible to great variation of temperature; yet they cannot be reared on a coast exposed to the strong south-west winds, nor in localities subject to frost.

The ground round lemon trees requires to be hoed three times a year—in December, after the heavy autumnal rains, in April, and lastly in May, in order that they may be easily watered in summer. To water a plantation of 2½ acres twice a week, the quantity of water required is 10,500 hectolitres to continue from May to September.

The clearing away of dried twigs and suckers precedes the pruning, and sometimes renders the latter unnecessary. A proper pruning will often enable the trees to resist the effect of a violent scirocco.

PICKLING LEMONS.

The pickling of lemons for exportation is a very simple process. They are first cut in two and immersed in salt water for from three to eight days; they are then placed in casks with alternate layers of salt. Salt water is then introduced to fill up spaces, and the cask is closed up ready for exportation.

ORANGE FLOWER WATER.

With all this there is another industry in this connexion which it is to be regretted is lost sight of in Sicily; or, if practised, it is only on a very small scale, *i.e.*, that of collecting the petals of the blossoms, whether of orange or lemon, that fall off and cover the ground as soon as the fruit appears, for making orange-flower water, which I have seen practised in other orange-growing countries.

CCCCLXXXI.—MISCELLANEOUS NOTES.

Weather and Attendance of Visitors in September.—Kew, in common with other parts of the country, experienced exceptionally fine warm weather during the latter part of the month of September. The lawns and borders were in excellent order, and visitors came in large numbers. The highest attendance was on Sunday the 22nd September when it reached 21,427. The week-day attendance was also large, and ranged from 2619 to 3750 per day. The days were singularly bright and sunny. The effect on the plants is likely to be most beneficial, as the growth made during the rainy days of August was ripened before the arrival of frost. The highest shade temperature recorded during the month was 84° Fahr. on the 24th. This was the highest of any at Kew during recent years. It was remarkable as following a minimum temperature on the grass of 31° Fahr. on the preceding night. This gives a range of temperature during the 24 hours of 53 degrees. The hot weather lasted exactly a week, the maximum temperature never falling below 76° from the 23rd to the 30th.

Botanical Magazine.—The following plants are figured in the September number: *Helianthus debilis*, *Rumex hymenosepalus*, *Cleyera Fortunei*, *Atraphaxis Muschketowi*, and *Richardia Rehmanni*. With the exception of the *Cleyera* all the plates were prepared from plants that flowered at Kew. The *Helianthus* is a native of the South-eastern States of North America, and is one of the less ornamental species. *Rumex hymenosepalus* is the "Canaigre," a plant yielding a tanning material, fully described in the *Kew Bulletin*, 1892, pp. 63–69, and 1894, pp. 167–8. It was raised from seed sent by Dr. F. H. Goodwin, of Tucson, Arizona. *Cleyera Fortunei* is the *Eurya latifolia variegata* of gardens, which has been in cultivation in this country upwards of 30 years, but as it very rarely flowers, its true genus has only recently been determined. *Atraphaxis* is a dwarf shrub, native of Central Asia, and belonging to the *Polygonaceæ*. It has small pink and white flowers in terminal erect racemes. *Richardia Rehmanni*, from Natal, has interrupted white streaks on the leaves, and the spathes are greenish-yellow on the outside; the recurved portion of the inner surface being white suffused with pink. Tubers were sent to Kew in 1893 by Mr. Medley Wood, A.L.S., Curator of the Durban Gardens.

Queensland Cherry.—The fruit of an Euphorbiaceous plant (*Antidesma dallachyanum*, Baill.) is known as the Herbert River or Queensland Cherry. The plant yielding it is a shrub or small tree closely allied to *A. Ghæsembilla*, Gærtn. of the Eastern Archipelago and Ceylon. According to Bailey "the fruit, which in size equals that of large cherries, is of a sharp acid flavour resembling that of the red currant which it also equals in colour when made into jelly. As the European fruit is placed among medicinal plants on account of its juice being grateful to the parched palates of persons suffering from fever, this is worthy of a similar place." Kew is indebted to Mr. J. H. Maiden, F.L.S., Superintendent of the Technological Museum, Sydney, New South Wales, for fresh specimens of this interesting Australian fruit for the gardens and also for the Museums of Economic Botany.

Dried Plants from British North Borneo.—Governor Creagh, C.M.G., who has recently returned to England, brought with him a collection of dried plants made by himself and consisting of about 1100 numbers. This he has presented to Kew on the condition of the plants being worked out as soon as possible. It is expected that the collection contains a considerable number of novelties.

Fruit of Sararanga.—Mature fruit of this singular Pandanad has been received from Admiral Wharton, C.B., Hydrographer to the Admiralty. It was collected by the officers of H.M.S. "Penguin" (*Kew Bulletin*, 1895, p. 159).

Hortus Fluminensis.—Under this title Senhor J. Barbosa Rodrigues, the Director of the Botanic Garden of Rio de Janeiro, has issued a sumptuous volume to serve as a guide to visitors. In Brazil where botanical books are probably rare the detailed description may perhaps be useful, but they increase the bulk of the book to such an extent as to make it burdensome to carry about. There is one feature in this guide, however, which renders it unusually attractive among publications of a similar character. This is a series of admirably executed views in different parts of the garden. The palms are particularly attractive in those views, which include the famous avenue of *Oreodoxa regia*. It would appear too that the Director is exceedingly well housed.

Liberian Coffee.—A good deal of interest is at present shown in the cultivation of this coffee in tropical countries. The construction of suitable machines for pulping the fresh cherries has given greater confidence to planters, while the prices paid for Liberian coffee both in London and New York support the industry with the promise of stability and success. The following extract taken from the *Proceedings of the Agri.-Horticultural Society* of Madras, 1895, pp. 201–202. (evidently from the same pen as the information given in the *Kew Bulletin* 1890, pp. 247–249), will be read with interest :—

EXTRACT from PROCEEDINGS of the AGRI.-HORTICULTURAL SOCIETY of MADRAS.—April–June, 1895.

Liberian Coffee.—Read the following letter from Mr. H. B. Winterbotham, dated Anda Tode Estate, Vayitri, S. Wynaad, 6th May 1895 :—"I am in receipt of your letter of the 4th May and I shall be glad to give you any information which may interest you regarding Liberian coffee in which I take a great interest. The height of this place above sea is about 2400 feet. The Liberian we find will grow from 500 feet to 3000 feet. It ripens earlier at the lowest level, and takes 14 months from blossom at this elevation to ripen its fruit, but it seems to bear very satisfactorily from 2000 to 2500 feet. The small piece from which I am collecting seeds planted 10′ × 10′ and now 14 years old has averaged over 12 cwts. clean coffee per acre for eight years past. The trees are now 20 feet high or more, and the fruit has to be picked by small boys with ladders. The first two trees planted by me 20 years ago came from Kew. They are now large trees, 33 feet high, near my bungalow, and from these nearly the whole district has been planted, there being now nearly 4000 acres under this species planted during the past six or eight years, and most of this will soon be coming into bearing and will, I believe, replace Arabian coffee almost entirely at low elevations. Temperature during monsoon is steady at about 68°. During winter (November to end of January), it is cold at night, 50° sometimes running up to 80° in sun in middle of day. From February to May temperature runs up to 85° in the shade. Liberian coffee does not mind sun but requires a certain amount of moisture with good drainage, and does not like heavy wind. Rainfall here is from 110 to 130 inches a year, very little falls from November to end of March. The country is rather steep and hilly. But the estates near the ghauts get sometimes 200 inches. Those inland as little as 60. On all these places there is good Liberian to be seen. The sample of coffee of this giant kind is good; something like a date stone in appearance, has lately been valued at 85*s*. to 90*s*. in London, or say 10*s*. per cwt. less than Arabian. I am supplying seedlings to planters in large quantities; these, if put into nurseries 6″ × 6″ apart, shaded and watered till following June, should be plants 12″ high, and ready to go out into the open in pits 20″ × 20″. The plant does not grow very much the first year; after two years it comes on quickly. We find topping the tree or pruning in any way seems to put them back. Any other questions I shall be glad to answer."

Liberian coffee affords a striking example of the intense conservatism of persons engaged in commerce. It was first grown at Kew in 1872, nearly a quarter of a century ago. Sir Joseph Hooker spared no pains in bringing it under the notice of planters, and by 1876 it had been raised in large quantity and distributed from Kew to every tropical colony. As stated in the Report for that year (p. 10), "it excited the expectations of coffee planters in all parts of the world to the highest degree." This enthusiasm was however materially damped when the produce was found to be received with little favour in the home market. It was not till it was known to be saleable at a remunerative price in the United States that interest in its cultivation again revived. This in turn stimulated mechanical inventors in devising machines for overcoming the difficulty of pulping the berries.

Full information respecting the cultivation and curing of Liberian coffee has appeared in the *Kew Bulletin* as follows:—

Historical and Descriptive Account, 1890, pp. 245–253.
Liberian Coffee at the Straits Settlement, with value of parchment coffee cleaned and sold in London, 1888, pp. 261–263.
Yield of Liberian Coffee in Selangor and Ujong, 1890, pp. 107–108, and 1892, pp. 277–282.
Liberian Coffee in Java, 1893, p. 25.
Husking in London not advisable, *ibid.*, 132.
Liberian Coffee at Sierra Leone, *ibid.*, p. 167.
Pulping Liberian Coffee, *ibid.*, pp. 204–206.
Immunity from Attacks of Coffee-leaf Miner, 1894, p. 132.
Cultivation at the Gold Coast, 1895, pp. 12–13, and pp. 21–23.

The cultivation of Liberian coffee was strenuously advocated in Ceylon by the late Mr. A. M. Ferguson, C.M.G., who published at Colombo an excellent "History of the Introduction and Progress of the Cultivation up to 1878." It however made little progress owing to its unsuitability for the "topping treatment" which the Ceylon planters had been in the habit of applying to Arabian coffee, and latterly owing to the superior attractions of tea. From Mr. Winterbotham's experience, stated above, it would appear that in Southern India, at least, topping and pruning are not adopted with Liberian coffee.

6203. 6. 94.

Wyman & Sons, L^{td} Lith.

Blumea balsamifera, D.C.

ROYAL GARDENS, KEW.

BULLETIN OF MISCELLANEOUS INFORMATION.

No. 107.] NOVEMBER. [1895.

CCCCLXXXII.—AI CAMPHOR.

(*Blumea balsamifera*, D.C.)

(With Plate.)

An evergreen shrubby composite, sometimes growing into a small tree, is very abundant in Eastern India, where it is often "a most common and troublesome weed." It is found also in South China and the islands of Hainan and Formosa. The whole plant is woolly, with the flowers on the stout branches of a large spreading or pyramidical panicle. The pappus is red. The leaves smell strongly of camphor. The species is described in Hooker's *Flora of British India*, iii., p. 270, and figured in *Hooker's Icones Plantarum*, t. 1957. In the latter the following note is quoted from Dr. Henry: "From this is produced in Kwangtung and Hainan the peculiar camphor known to the Chinese as *ngai-fên*, signifying the crude product, and *ngai-p'ien*, the name given to the refined article. The export from the port of Hoihow in Hainan of the crude camphor is about 15,000 lbs. annually. This is refined in Canton, from which there is an annual export of about 10,000 lbs. of *ngai-p'ien*. Hanbury (*Science Notes*, p. 394) gives an account of the camphor, and mentions that the plant in question is well known to emit when bruised a strong odour of camphor, and that in Burmah a crude camphor is extracted from it. For the physical and chemical properties of this peculiar camphor, see *Pharmaceutical Journal*, ser. 3, vol. iv., pp. 710–712."

In the following letter Dr. Henry describes the details of the process employed by the Chinese in extracting the camphor from this plant in the Island of Hainan.

Dr. A. Henry, F.L.S., to Royal Gardens, Kew.

Takow, Formosa,
January 27, 1893.

Dear Mr. Dyer,

Some time ago Mr. Ridley, of Singapore, asked me to find out the details of the process, employed by the Chinese in Hainan, for the extraction of *Ai* Camphor from *Blumea balsamifera*, D.C. He had tried to obtain the camphor by distillation from the leaves of the plant, but had only succeeded in getting an oil. Through the kind offices of Mr. Unwin of the Chinese Customs at Hoihow, I have received the following interesting account of the process from the Rev. F. P. Gilman, and I send it to you for insertion in the *Kew Bulletin.* Mr. Gilman is a member of the American Presbyterian Mission, stationed in Kiungchow, the capital of Hainan, and he makes journeys from time to time in the interior of the island, which is inhabited by the *Loi*, a non-Chinese race.

"During a recent missionary journey I travelled the entire length of the Loi country, and collected two specimens of the leaves of the plant from which the camphor is distilled, and in several places I saw the natives manufacturing the article, and I had a chance to inquire carefully into the process.

"The plant is in flower in July and August. During the fall and winter months the Chinese of the island, or the aboriginal Lois in Chinese employ, collect the young leaves of the plant which there grows to a height of 8 or 10 feet. They say they only take the last three joints of the branch, as in the specimens which I have collected. These leaves are allowed to remain on the branch, and are wilted for a couple of days. They are then placed in the retort, which is a cask about two feet high, open at both ends, and of a diameter suitable to place it over a large Chinese frying pan (say, the diameter is 20 inches). The frying pan is filled with water, and over the water is placed a coarse sieve of woven bamboo to separate the leaves from the water. The cask is cemented with clay to the edge of the pan, and after receiving its charge of 30 lbs. or 40 lbs. of the leaves, a large brass basin is placed on the upper open end of the cask, and is filled with cold water which is frequently changed. Fire is placed under the frying pan, and the process of distillation is continued for about four hours. At the end of that time the brass pan is lifted off, and its lower surface is found to be coated with a layer of crystallized substance about a sixteenth of an inch thick. This is the *gnia-hūn* (local dialect for *ai-fên*) or crude camphor, which Mr. Unwin, the Commissioner, tells me is sent to Canton and re-manufactured into *ai-p'ien* or refined camphor."

I enclose Mr. Gilman's specimen, which is not *Blumea balsamifera*, but, as well as I can make out from a cursory examination, is probably a species of *Buddleia.* There are no flowers, only leaves, and the latter have no camphoraceous odour when bruised. I am inclined to think that Mr. Gilman has been deceived as to the plant, and that the Chinese substituted the leaves of another plant for the one actually employed. I am inclined to think that *Blumea balsamifera* is the true source. The leaves of *Blumea* have a certain rude similarity to those sent by Mr. Gilman.

The authority for *Blumea* as the source of this peculiar camphor rests on Hanbury, *Science Papers*, p. 394. In *Hooker's Icones Plantarum*, tab. 1957, this plant is figured, and some particulars as regards the trade in the commodity, &c. are given there from me.

Yours, &c.
(Signed) AUGUSTINE HENRY.

For the following further information Kew is indebted to Mr. M. F. A. Fraser, H.M. Consul, Pakhoi, who communicated it, together with a series of specimens for the Museum, in a letter dated 5th December 1893.

A.—TRANSLATION from the *Pen-ts'ao Kang muh*, or great Materia Medica, by Li Shi-chen, date about 1600 A.D.

Thousand-year *ngai* (*Blumea balsamifera*), grows originally at Wu-tang (? in Hupeh Province, lat. 32° 40′, long. 111° 08′), and in

Tai Ho Hills (? in Anhui Province, lat. 33° 10′, long. 115° 43′), has a somewhat slender stalk somewhat over a *chih* (about 14 inches) long. The root is like that of the *p'êng-hao* (*Chrysanthemum coronarium** *?*), its leaves are rather more than a *ts'un* ($1\frac{1}{2}$ inch) long, and are without points (*i.e.*, simple or entire). The faces of the leaves are dark (or green), the backs white. In autumn the flowers open, yellow, like the wild chrysanthemum,† and small. The seeds (or fruits) are like dark pearls and look like little lumps of cinnabar (?). During the dog-days of summer the leaves are gathered and dried. The leaves are not like those of the *ngai* (*Artemisia vulgaris*), but have the same odour. When triturated they crumble to dust at once, and do not make a soft mass holding together like the leaves of the *ngai* when similarly treated. The Taoists use them to make up prescriptions. Doctors administer them boiled in water for female complaints and for colds in men (?).

B.—Notes obtained from various sources on the subject of Ngai Camphor.

The *ai*, called *Ta fuh* (great happiness) *ai*, is a plant which grows pretty well over the Kwangsi, Yünnan, and Kweichow Provinces, but the choicest quality is produced at a place called Ta Kang Fow, about 32 miles (100 *li*) from Yünnan Fu, the capital city of Yünnan.

Processes of preparation :—

1. A large pan or cauldron is filled with water, and a tin or can without a lid set upright in it. This tin has a small aperture beneath, into which is fitted a metal tube. The plant is put into the tin, and a second iron pan put over the tin like a cap. This pan has an aperture through which issues the tube leading from the can. The water is made to boil, and the steam, having no other means of egress but the tube, passes through the can and out of the covering iron pan, steaming the plant on its way, and condensing as "*ai* dew."
2. In the second place the "*ai* dew" is put into a tin or can which has no orifice in it, and, with that variation, treated as before. The product is called *ai fen* (or "*ai* flour" or "powder").
3. The "*ai* powder" is treated according to the first of the three processes, and the essence thus distilled is the fragrant *ai yu*, or "*ai* oil."

C.—The following account was given by a Chinese dealer from Kwangsi, who came to Pakhoi in September 1893, to Chen-Sien-Sheng, Her Majesty Consulate's Chinese writer.

Small *ngai* is otherwise called "5th month *ngai*," and "duck's foot *ngai*," the *Pen-ts'ao* calls it *ngai*, also "white *ngai*" (*Artemisia vulgaris*).

Great *ngai*, vulgar name "great-luck *ngai*"; in the *Pen-ts'ao* it is called "1000-year *ngai*" (*Blumea balsamifera*).

(Signed) M. F. A. Fraser

Pakhoi, Dec. 1893.

Explanation of Plate.

1. Capitulum. 2. Female floret. 3. Disk floret. 4. Seta of pappus. 5. Anthers. 6. Stigma. *Enlarged.*

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* So rendered by Giles. *See* Brettschneider, *Botanicon Sinicum*, 1892, p. 253 (No. 436).

† *See* Brettschneider, p. 77. Apparently *Pyrethrum indicum*.

CCCCLXXXIII.—BOTANICAL NOMENCLATURE.

At the recent meeting of the British Association at Ipswich, the Director of the Royal Gardens, in the course of his presidential address on September 12th, at the opening of the new Botanical Section K, made the following remarks on the subject of botanical nomenclature.

NOMENCLATURE.

There is one subject upon which, from my official position elsewhere, I desire to take the opportunity of saying a few words. It is that of nomenclature. It is not on its technical side, I am afraid, of sufficient general interest to justify my devoting to it the space which its importance would otherwise deserve. But I hope to be able to enlist your support for the broad common-sense principles on which our practice should rest.

As I suppose, everyone knows we owe our present method of nomenclature in natural history to Linnæus. He devised the binominal, or, as it is often absurdly called, the binomial system. That we must have a technical system of nomenclature I suppose no one here will dispute. It is not, however, always admitted by popular writers who have not appreciated the difficulty of the matter, and who think all names should be in the vernacular. There is the obvious difficulty that the vast majority of plants do not possess any names at all, and the attempts to manufacture them in a popular shape have met with but little success. Then, from lack of discriminating power on the part of those who use them, vernacular names are often ambiguous; thus Bullrush is applied equally to *Typha* and to *Scirpus*, plants extremely different. Vernacular names, again, are only of local utility, while the Linnean system is intelligible throughout the world.

A technical name, then, for a plant or animal is a necessity, as without it we cannot fix the object of our investigations into its affinity, structure, or properties.* "Nomina si nescis perit et cognitio rerum."

In order to get clear ideas on the matter let us look at the logical principles on which such names are based. It is fortunate for us that these are stated by Mill, who, besides being an authority on logic, was also an accomplished botanist. He tells us: † "A naturalist, for purposes connected with his particular science, sees reason to distribute the animal or vegetable creation into certain groups rather than into any others, and he requires a name to bind, as it were, each of his groups together." He further explains that such names, whether of species, genera, or orders, are what logicians call connotative: they *denote* the members of each group, and *connote* the distinctive characters by which it is defined. A species, then, connotes the common characters of the individuals belonging to it; a genus, those of the species; an order, those of the genera.

But these are the logical principles which are applicable to names generally. A name such as *Ranunculus repens* does not differ in any particular from a name such as John Smith, except that one denotes a species, the other an individual.

This being the case, and technical names being a necessity, they continually pass into general use in connection with horticulture, commerce, medicine, and the arts. It seems obvious that, if science is to keep in touch with human affairs, stability in nomenclature is a thing not merely to aim at but to respect. Changes become necessary, but should never be insisted on without grave and solid reason. In some cases they are inevitable unless the taxonomic side of botany is to remain at a standstill. From time to time the revision of a large group has to be undertaken from a uniform and comparative point of view. It then often occurs that new genera are seen to have been too hastily founded on insufficient grounds, and must therefore be merged in others. This may involve the creation of a large number of new names, the old ones becoming henceforth a burden to literature as synonyms. It is usual in such cases to retain the specific portion of the original name, if possible. If it is, however, already preoccupied in the genus to which the transference is made, a new one must be devised. Many modern systematists have, however, set up the doctrine that a specific epithet once given is indelible, and whatever the taxonomic wanderings of the organism to which it was once assigned, it must always accompany it. This, however, would not have met with much sympathy from Linnæus, who attached no importance to the specific epithet at all: "Nomen specificum sine generico est quasi pistillum sine campana." * Linnæus always had a solid reason for everything he did or said, and it is worth while considering in this case what it was.

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* *Linn. Phil.*, 210.

† *System of Logic*, i. 132.

Before his time the practice of associating plants in genera had made some progress in the hands of Tournefort and others, but specific names were still cumbrous and practically unusable. Genera were often distinguished by a single word; and it was the great reform accomplished by Linnæus to adopt the binominal principle for species. But there is this difference. Generic names are unique, and must not be applied to more than one distinct group. Specific names might have been constituted on the same basis; the specific name in that case would then have never been used to designate more than one plant, and would have been sufficient to indicate it. We should have lost, it is true, the useful information which we get from our present practice in learning the genus to which the species belongs; but theoretically a nomenclature could have been established on the one-name principle. The thing, however, is impossible now, even if it were desirable. A specific epithet like *vulgaris* may belong to hundreds of different species belonging to as many different genera, and taken alone is meaningless. A Linnean name, then, though it consists of two parts, must be treated as a whole. "Nomen omne plantarum constabit nomine generico et specifico."† A fragment can have no vitality of its own. Consequently, if superseded, it may be replaced by another which may be perfectly independent.‡

It constantly happens that the same species is named and described by more than one writer, or different views are taken of specific differences by various writers; the species of one are therefore "lumped" by another. In such cases, where there is a choice of names, it is customary to select the earliest published. I agree, however, with the late Sereno Watson § that "there is nothing whatever of an ethical character inherent in a name, through any priority of publication or position, which should render it morally obligatory upon anyone to accept one name rather than another." And in point of fact Linnæus and the early systematists attached little importance to priority. The rigid application of the principle involves the assumption that all persons who describe or attempt to describe plants are equally competent to the task. But this is so far from being the case that it is sometimes all but impossible even to guess what could possibly have been meant.*

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* *Phil.*, 219.

† *Phil.*, 212.

‡ As Alphonse de Candolle points out in a letter published in the *Bull. de la Soc. bot. de France* (xxxix.), "the real merit of Linnæus has been to combine, for all plants, the generic name with the specific epithet." It is important to remember that in a logical sense the "name" of a species consists, as Linnæus himself insisted, in the combination, not in the specific epithet, which is a mere fragment of the name, and meaningless when taken by itself.

§ *Nature*, xlvii., 54.

In 1872 Sir Joseph Hooker† wrote: "The number of species described by authors who cannot determine their affinities increases annually, and I regard the naturalist who puts a described plant into its proper position in regard to its allies as rendering a greater service to science than its describer when he either puts it into a wrong place or throws it into any of those chaotic heaps, miscalled genera, with which systematic works still abound." This has always seemed to me not merely sound sense, but a scientific way of treating the matter. What we want in nomenclature is the maximum amount of stability and the minimum amount of change compatible with progress in perfecting our taxonomic system. Nomenclature is a means, not an end. There are perhaps 150,000 species of flowering plants in existence. What we want to do is to push on the task of getting them named and described in an intelligible manner, and their affinities determined as correctly as possible. We shall then have material for dealing with the larger problems which the vegetation of our globe will present when treated as a whole. To me the botanists who waste their time over priority are like boys who, when sent on an errand, spend their time in playing by the roadside. By such men even Linnæus is not to be allowed to decide his own names. To one of the most splendid ornaments of our gardens he gave the name of *Magnolia grandiflora*: this is now to be known as *Magnolia fœtida*. The reformer himself is constrained to admit, "The change is a most unfortunate one in every way."‡ It is difficult to see what is gained by making it, except to render systematic botany ridiculous. The genus *Aspidium*, known to every fern-cultivator, was founded by Swartz. It now contains some 400 species, of which the vast majority were of course unknown to him at the time; yet the names of all these are to be changed because Adanson founded a genus, *Dryopteris*, which seems to be the same thing as *Aspidium*. What, it may be asked, is gained by the change? To science it is certainly nothing. On the other hand, we lumber our books with a mass of synonyms, and perplex everyone who takes an interest in ferns. It appears that the name of the well-known Australian genus *Banksia* really belongs to *Pimelea*: the species are therefore to be renamed, and *Banksia* is to be rechristened *Sirmuellera*, after Sir Ferdinand von Mueller; a proposal which, I need hardly say, did not emanate from an Englishman.

I will not multiply instances. But the worst of it is that those who have carefully studied the subject know that, from various causes which I cannot afford the time to discuss, when once it is attempted to disturb accepted nomenclature it is almost impossible to reach finality. Many genera only exist by virtue of their redefinition in modern times; in the form in which they were originally promulgated they have hardly any intelligible meaning at all.

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* Darwin, who always seems to me, almost instinctively, to take the right view in matters relating to natural history, is (*Life*, vol. i. p. 364) dead against the new "practice of naturalists appending for perpetuity the name of the *first* describer to species." He is equally against the priority craze:—"I cannot yet bring myself to reject very *well-known* names" (*ibid.*, p. 369).

† *Flora of British India*, i. vii.

‡ *Garden and Forest*, ii. 615.

It can hardly be doubted that one cause of the want of attention which systematic botany now receives is the repulsive labour of the bibliographical work with which it has been overlaid. What an enormous bulk nomenclature has already attained may be judged from the *Index Kewensis,* which was prepared at Kew, and which we owe to the munificence of Mr. Darwin. In his own studies he constantly came on the track of names which he was unable to run down to their source. This the *Index* enables to be done. It is based, in fact, on a manuscript index which we compiled for our own use at Kew. But it is a mistake to suppose that it is anything more than the name signifies, or that it expresses any opinion as to the validity of the names themselves. That those who use the book must judge of for themselves. We have indexed existing names, but we have not added to the burden by making any new ones for species already described.

What synonymy has now come to may be judged by an example supplied me by my friend Mr. C. B. Clarke. For a single species of *Fimbristylis* he finds 135 published names under six genera. If we go on in this way we shall have to invent a new Linnæus, wipe out the past, and begin all over again.

Although I have brought the matter before the Section it is not one in which this, or indeed any collective assembly of botanists, can do very much. While I hope I shall carry your assent with the general principles I have laid down, it must be admitted that the technical details can only be appreciated by experienced specialists. All that can be hoped is a general agreement amongst the staffs of the principal institutions in different countries where systematic botany is worked at ; the free-lances must be left to do as they like.

CCCCLXXXIV.—NEW ORCHIDS.—DECADE 15.

141. **Dendrobium curviflorum,** *Rolfe;* caule erecto brevi, foliis equitantibus lanceolatis subacutis carnosis, floribus axillaribus solitariis, bracteis ovatis subobtusis fasciculatis, sepalo postico ovato-oblongo obtuso lateralibus similibus basi in mentum curvum obtusum longe extensis, petalis lineari-oblongis obtusis, labello obovato-cuneato retuso, disco lævi, columna brevissima pede longo incurvo.

HAB.—Himalaya mountains, and probably Sikkim.

Caulis 6 poll. longus. *Folia* $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longa, 3 lin. lata. *Bracteæ* 1–$1\frac{1}{2}$ lin. longæ. *Pedicelli* 7–8 lin. longi. *Sepalum* posticum $5\frac{1}{2}$ lin. longum, lateralia 1 poll. longa. *Petala* 5 lin. longa. *Labellum* 1 poll. longum. *Columna* 1 lin. longa. *Mentum* 9 lin. longum.

A member of the section *Aporum* with unusually large flowers, being as much as $1\frac{3}{4}$ inches long, white with a faint pink suffusion on the back of the sepals, and a yellow line down the centre of the lip terminating in a deeper blotch in front. It first flowered with Mr. James O'Brien in October 1892.

142. **Cirrhopetalum compactum,** *Rolfe;* cæspitosum, pseudobulbis ovoideis monophyllis, foliis elliptico-oblongis obtusis carnosis sessilibus, scapis gracilibus paucifloris, floribus subumbellatis nutantibus, bracteis lineari-lanceolatis acuminatis, sepalo postico oblongo-lanceolato acuto

concavo glabro lateralibus oblongo-linearibus obtusis, petalis triangulari-ovatis acutis glabris, labello sagittato-oblongo obtuso, columna brevissima dentibus brevibus.

HAB.—Tenasserim: Panga, *Curtis.*

Pseudobulbi 3–4 lin. longi. *Folia* 1–1¼ poll. longa, 4–5½ lin. lata. *Scapus* 2¼ poll. longus. *Bracteæ* 1½ lin. longæ. *Pedicelli* 1½ lin. longi. *Sepalum* posticum 2 lin. longum; lateralia 5½–6 lin. longa. *Petala* 1½ lin. longa. *Labellum* 1 lin. longum.

A small species sent to Kew by Mr. C. Curtis, of the Forest Department, Penang, which flowered in September last. It is allied to *C. parvulum*, Hook. f., and *C. acutiflorum*, Hook. f. Flowers uniformly pale straw-coloured.

143. **Trias vitrina**, *Rolfe ;* rhizomate repente, pseudobulbis approximatis ovoideis monophyllis, foliis subsessilibus oblongo-lanceolatis subacuminatis carnosis, floribus solitariis v. fasciculatis breviter pedicellatis, sepalo postico ovato acuto erecto apice recurvo lateralibus ovatis acutis supra medium reflexis, petalis subspathulato-oblongis acutis erectis, labello trilobo lobis lateralibus parvis falcato-subulatis erectis intermedio oblongo subobtuso amplo reflexo, disco convexo supra basin bicarinato, columna brevissima crassissima apice rostrata.

HAB.—Tenasserim; Panga, *Curtis.*

Pseudobulbi 6–10 lin. longi. *Folia* 2½–3½ poll. longa, 5–8 lin. lata. *Pedicelli* 6 lin. longi. *Sepalum* posticum 7 lin. longum, 5 lin. latum; lateralia 8 lin. longa, 4 lin. lata. *Petala* 2¼ lin. longa. *Labellum* 6 lin. longum, 2½ lin. latum. *Columna* 2 lin. longa.

Sent to Kew with the preceding *Cirrhopetalum.* Sepals a very pale shining green, and the apex of the petals and base of the lip marked with red-brown. Leaves longer and more acute and the flowers larger than in the previously known species.

144. **Cœlogyne Veitchii**, *Rolfe* ; pseudobulbis fusiformi-oblongis demum angulatis diphyllis, foliis lanceolato-oblongis acutis subcoriaceis, scapis pendulis multifloris basi vaginatis, bracteis obovato-oblongis subacutis convolutis, sepalo postico lanceolato-oblongo acuto carinato concavo suberecto, lateralibus connatis lanceolato-oblongis acutis carinatis conduplicato-concavis erectis, petalis lanceolatis acutis reflexis, labello trilobo basi saccato lobis lateralibus amplis rotundatis columnam involventibus intermedio late orbiculari-ovato acuto recurvo, disco basi obtuse tricarinato apice lævi, columna brevi clavata dilatato-alata apice subtruncata crenulata.

HAB.—Western New Guinea, *Burke.*

Pseudobulbi 3½–4 poll. longi. *Folia* 5–7 poll. longa, circa 1½ poll. lata. *Scapi* ½–2 ped. longi. *Bracteæ* 6–8 lin. longæ. *Pedicelli* 6–8 lin. longi. *Sepala* 6 lin. longa. *Petala* 5 lin. longa. *Labellum* 6–7 lin. longum. *Columna* 3 lin. longa.

A very distinct species, which flowered in the establishment of Messrs. James Veitch & Sons in August last. Flowers pure white, borne in long pendulous racemes. The short column, the absence of markings on the lip, and the very short rather obscure basal keels are quite different from any previously known species.

145. **Polystachya Kirkii**, *Rolfe ;* pseudobulbis cæspitosis lineari-oblongis subteretibus monophyllis, foliis sessilibus lineari-oblongis acutis, scapis gracilibus interdum parce ramosis paucifloris basi ancipitibus,

bracteis triangulari-lanceolatis acutis, sepalo postico lanceolato-ovato acuto lateralibus late triangularibus carinatis apice subfalcatis acutis, petalis lanceolatis acutis, labello trilobo intus pubescente lobis lateralibus parvis semioblongis obtusissimis erectis intermedio ovato acuto, callo lineari-oblongo valde carnoso pubescente, columna lata.

HAB.—East Tropical Africa: Mombasa district, *Sir John Kirk*.

Pseudobulbi 1¼–2 poll. longi. *Folia* 3–5 poll. longa, 7–10 lin. lata. *Scapi* 2–3 poll. longi. *Bracteæ* 1–1¼ lin. longæ. *Pedicelli* 2–2½ lin. longi. *Sepalum* posticum 3½ lin longum, 1½ lin. latum; lateralia 4 lin. longa, 4 lin. lata. *Petala* 3½ lin. longa, 1 lin. lata. *Labellum* 3¼ lin. longum, 2½ lin. latum. *Columna* 1 lin. longa.

A very distinct species, allied to *P. lawrenceana*, Kränzl. It first flowered in the Kew collection in June 1894. Flowers white with a faint suffusion of pale green; front lobe of the lip margined with light purple. Readily distinguished from its allies by the shape of the pseudobulbs, the flattened scapes, and the shape and colour of the flowers.

146. **Lueddemannia triloba**, *Rolfe;* pseudobulbis ovoideo-oblongis, foliis lanceolatis acutis, scapis pendulis brevibus multifloris nigro-puberulis, bracteis oblongis obtusis concavis, pedicellis nigro-puberulis, sepalo postico elliptico-oblongo obtuso concavo lateralibus paullo latioribus, petalis oblongo-lanceolatis subobtusis, labello trilobo basi cuneato concavo lobis lateralibus rotundatis obtusis intermedio triangulari acuto, disco medio unidentato basi unidentato, columna clavata alis parvis late rotundatis carnosis.

Hab.—Andes of S. America.

Pseudobulbi circa 2½ poll. longi. *Folia* circa 1 ped. longa. *Scapi* 6–7 poll. longi. *Bracteæ* 3–5 lin. longæ. *Pedicelli* 6–7 lin. longi. *Sepala* 9–10 lin. longa, posticum 5 lin. latum, lateralia 6 lin. lata. *Petala* 9–10 lin. longa, 4 lin. lata. *Labellum* 10 lin. longum, 9 lin. latum. *Columna* 9 lin. longa.

This flowered in the collection of Sir Trevor Lawrence, Bart., in July last. Distinguished from the two species previously known by the short rounded side lobes of the lip, with more saccate base, and the much shorter scapes. Sepals light yellow lightly suffused with madder brown, petals deep yellow; lip orange-yellow, with a few madder brown marks at the extreme base.

147. **Catasetum uncatum**, *Rolfe;* pseudobulbis fusiformi-oblongis foliatis, foliis lanceolatis v. oblongo-lanceolatis acuminatis plicatis, florum ♂ scapis erectis v. arcuatis multifloris, bracteis lanceolato-oblongis acutis, sepalis petalisque subpatentibus oblongo-lanceolatis acutis concavis, submembranaceis, labello galeato apice inflexo subacuto lobis lateralibus amplis rotundatis denticulatis, columna clavata antennis longis subparallelis, florum ♀ scapis erectis paucifloris, bracteis ut in ♂, sepalis petalisque patentibus v. reflexis oblongo-lanceolatis acutis planiusculis carnosis, labello galeato ore integro, columna brevissima ecirrhosa.

HAB.—Brazil: prov. Pernambuco.

Pseudobulbi 3–8 poll. longi. *Folia* 10–14 poll. longa, 1½–2½ poll. lata. *Scapi* 1–2 poll. longi. *Bracteæ* 4–7 lin. longæ. *Pedicelli* 1–1½ poll. longi. *Sepala* et *petala* fl. ♂ 10–15 lin. longa. *Labellum* 5–7 lin. longum. *Columna* 4–6 lin. longa. *Sepala* et *petala* fl. ♀ 7–8 lin. longa. *Labellum* 7–8 lin. longum. *Columna* 3 lin. longa.

This was sent home with *Cattleya labiata*, Lindl., and has flowered in several different collections. Messrs. F. Sander & Co. had both sexes, which were presented to Kew. Allied to *C. albovirens*, Rodr., but the sepals and petals of the male flowers are twice as long as the lip, and sometimes more, while the front of the lip is curved round into a subacute apex. The flowers of both sexes are light green.

148. **Catasetum apertum**, *Rolfe;* pseudobulbis fusiformi-oblongis, foliis lanceolatis acuminatis, scapis suberectis paucifloris, bracteis lanceolatis oblongis subacutis, sepalis lanceolato-oblongis acutis concavis subpatentibus incurvis, petalis late elliptico-oblongis subobtusis concavis incurvis, labello supero galeato apice trilobo lobis lateralibus amplis rotundatis recurvis subintegris intermedio late triangulari obtuso sacco subhemisphærico, columna clavata rostrata antennis in planis diversis divergentibus.

HAB.—Not known.

Pseudobulbi 4–5 poll. longi. *Folia* 4–7 poll. longa, 1¼–2 poll. lata. *Scapi* circa 6 poll. longi. *Bracteæ* 6 lin. longæ. *Pedicelli* 1 poll. longi. *Sepala* 1½ poll. longa, 7 lin. lata. *Petala* 1½ poll. longa, 1 poll. lata. *Labellum* 1 poll. longum, 1¾ poll. latum; saccus ½ poll. altus. *Columna* 1 poll. longa; antennæ 8 lin. longæ.

A striking species belonging to the section *Eucatasetum*. It flowered in the collection of Sir Charles Strickland, Bart., in September, 1894. Allied to the Ecuadorean *C. macroglossum*, Rchb. f., still only known from the description, but it has no large semicircular transverse keel in front of the lip, as in that. Sepals and petals a very light apple green, with a few minute light brown spots; lip yellowish green, densely spotted and marbled with warm shining brown, and becoming wholly suffused with red brown inside the sac. Female flowers are unknown.

149. **Scelochilus carinatus**, *Rolfe;* cæspitosus, foliis lanceolato-linearibus acutis, scapis brevibus, racemis pendulis circa 7-floris, bracteis lineari-lanceolatis acuminatis, sepalo postico suberecto oblongo-lanceolato subobtuso carinato conduplicato-concavo lateralibus ad medium connatis subpatentibus basi in saccum obtusum productis cæteris similibus, petalis suberectis lineari-oblongis acutis apice reflexis, labello unguiculato, limbo reflexo orbiculari-obcordato basi bicalloso, lobis lateralibus in medio unguis falcato-incurvis, columna clavata pubescente angulis supra medium dilatatis.

HAB.—Andes of S. America, *Lehmann.*

Folia 3–4 poll. longa. *Scapi* 2 poll. longi. *Bracteæ* 3–4 lin. longæ. *Pedicelli* 6–7 lin. longi. *Sepala* 8 lin. longa, saccus 1½ lin. longus. *Petala* 5 lin. longa. *Labellum* 5 lin. longum. *Columna* 4 lin. longa.

This flowered in the collection of Sir Trevor Lawrence, Bart., in September last. Sepals light yellow; petals maroon-purple above with a white margin, lined with white and purple below; lip and column white, with a maroon-purple blotch at the base of the reflexed limb of the former.

150. **Saccolabium hainanense**, *Rolfe;* caule erecto distichophyllo, foliis lanceolato-linearibus subacutis carnosis subcarinatis canaliculatis, scapis horizontalibus v. deflexis paniculatis, bracteis oblongo-lanceolatis acutis, floribus secundis parvis numerosis, sepalis oblongis obtusis, petalis

oblongis obtusis, labello obovato-oblongo obtuso crasso-carnoso, calcare oblongo, columna brevissima.

HAB.—Hainan, *Rev. B. C. Henry.*

Caules ½ ped. alti v. ultra. *Folia* 1½–2¼ poll. longa, 2½–4 lin. lata. *Scapi* 3–6 poll. longi. *Bracteæ* ¾ lin. longæ. *Pedicelli* 1–1¼ lin. longi. *Sepala* 1 lin. longa. *Petala* ¾ lin. longa. *Labellum* 1½ lin. longum; calcar vix 1 lin. longum.

Allied to the Himalayan *Saccolabium gemmatum*, Lindl., but the leaves are nearly flat, not subterete, and more than twice as broad. Flowers white, with the exception of the petals and dorsal sepal, which are lilac-purple. The plant was sent by Mr. Ford from the Hongkong Botanic Garden to Kew, where it flowered in March last.

CCCCLXXXV.—BEGONIA DISEASE.

Cultivators of tropical herbaceous plants, such as Gloxinias, *Achimenes*, *Pentas*, *Impatiens*, Vincas, and especially Begonias, have recently become familiar with a "disease" which attacks these plants, sometimes crippling and practically destroying whole collections in a few weeks. It attacks chiefly the young leaves and flower-buds, causing the latter to wither and fall off, and the leaves to curl and become aborted. When the disease is bad, the youngest leaves are arrested in growth when very small, and the whole plant soon presents a hopelessly crippled appearance. The mature leaves are discoloured with patches of a black or brown colour, as if suffering from a rust-fungus of some kind.

The general impression with regard to the nature of this disease was that it is fungoid. Attention was called to it recently in the *Gardeners' Chronicle* for September 7 last in a paper on "Tuberous Begonias," by Mr. W. W. Sheath (pp. 267, 268), who stated that "Pot-plants (of Begonias) are sometimes infested with a kind of rust on the stems and leaves, which some growers say is a fungus, but I have found it more prevalent when in too much heat in spring; also by sudden changes of temperature or draughts; by imperfect drainage—in fact, by anything that would cause a check in the growth." On p. 305 there is a note signed "W. K.," wherein this disease is attributed to "large numbers of white insects, barely visible to the naked eye." Another correspondent, however, "H. W. C.," who says (p. 337) that he is an extensive grower of Begonias, does not believe that the small white insects are the cause of this rust-like disease, but inclines to believe that it is caused by a fungus.

A similar discussion has been going on concurrently in the pages of the *Garden*. The Assistant Curator of the Royal Gardens has been acquainted with this disease for some years, and at first thought it was due to some kind of rust-fungus, but now considers it to be caused by a very small insect or mite, so small as to be invisible to the naked eye. It runs very quickly, and therefore often soon leaves a leaf or shoot if disturbed. This no doubt accounts for the failure of experts to find the insect when specimens of the disease have been submitted to them.

By lightly fumigating once a week with tobacco the plants subject to the attacks of this pest, we have now no difficulty in keeping our Begonias clean; indeed, tobacco fumigation appears to be a perfect preventive, and almost a certain cure, if the plants have not been hopelessly crippled before it is applied. This year a batch of Acanthaceous plants, such as Justicias, Aphelandras, &c., had been suffering from this particular disease for some weeks before it was noticed. The gardener in charge of the plants thought a fungus was the cause of the curling and discoloration of the foliage. By frequently dipping the affected plants in a weak solution of tobacco, the plants were, in most cases, saved, and have since quite recovered.

Every cultivator knows how easily irregularity of temperature or atmospheric moisture will bring on an attack of red-spider or thrips among plants grown under glass, and this mite, which is smaller than either of the two pests named, and at least as quick-spreading and injurious in its effects on the health of the plant, can get a start from the same cause, viz., bad ventilation or some other fault in the atmosphere in the house containing the plants.

Certain forms of black blotching and leaf-curling which often disfigure Masdevallias of the Chimæra section and some others besides, are the work of an almost invisible insect, probably a relation of the mischievous little red-spider. It must be sought for very carefully, and when discovered it requires some care and perseverance to get rid of it.

Specimens of the diseased plants were submitted to a well-known authority who obligingly furnished the following report:—

Mr. A. D. MICHAEL, F.L.S., to ROYAL GARDENS, KEW.

Cadogan Mansions, Sloane Square,
November 5, 1895.

DEAR SIR,

THERE is not any doubt what the mite on your leaves is, nor any doubt that it is the cause of the damage. It is a *Tarsonymus*, the species is probably unrecorded; I think it most resembles *Kirchneri*, but is intermediate between that and *buxi*. I could make certain if it be either of these species if you wish it, but probably the minute differences would not interest you. The creatures of this genus escaped observation altogether until a few years since, in consequence of their minute size and mode of life; they are still very imperfectly known. They are all most destructive, attacking healthy plants and soon reducing them to a very bad condition. *Tarsonymus buxi* practically destroyed all the foliage of the box trees in some of the Italian Botanical Gardens a few years since, and in the *Kew Bulletin* for April 1890, p. 85, you will find a report of my own upon sugar-cane from Barbados which was seriously injured from the same cause (species different).

I fear I cannot give any very confident assistance in the eradication of the pest. These Acari are leaf-mining things which burrow in between the two surfaces of the leaf and thus get protected. They are most difficult to eradicate; probably the best methods will be to spray the plants from below so as to reach the under surfaces of the leaves, frequently, at short intervals, with such solutions of soap and sulphur, or benzol, or carbolic acid as the respective plants will bear. Plants which will stand it might be plunged in solution of fluid carbolic acid, 3 or 4 oz. to the gallon of water. Badly infected plants and all debris which is infected should be destroyed at once by fire or boiling water. Spraying healthy plants with solution of carbolic acid, even if very weak, would probably render them distasteful to the *Acarus*, if the plants will stand it without injury.

Yours truly,
(Signed) ALBERT D. MICHAEL.

CCCCLXXXVI.—RAFIA FROM WEST AFRICA—
(*continued.*)

A brief account was given in the *Kew Bulletin*, 1895 (pp. 88–92), of the production of the material known as Rafia, from species of palms in West Africa. This fibre has hitherto been exclusively obtained from Madagascar. It is used for tie bands by gardeners, as well as for making mats and decorative articles.

A sample of West African Rafia, obtained from the leaflets of *Raphia vinifera*, locally known as the Bamboo palm, was brought to Kew by Mr. Henry Millen, Curator of the Botanic Station at Lagos, in August last. The following reports were obtained on this sample :—

Messrs. IDE and CHRISTIE to ROYAL GARDENS, KEW.

72, Mark Lane, London, E.C.,
September 4, 1895.

DEAR SIR,

YOUR favour of yesterday and samples to hand. The latter show just as we formerly experienced, bad colour (*i.e.*, brown in lieu of creamy white), very short (one sample was longer), all stringy, not flat-open. The trade, unless in famine, would not entertain it ; appearance goes a long way nowadays, although for some tying purposes, this West Coast product should do as well as the Madagascar.

If asked for a value, we would hazard 20*l.* per ton.

Yours faithfully,
(Signed) IDE and CHRISTIE.

D. Morris, Esq., C.M.G., D.Sc.,
Royal Gardens, Kew.

Messrs. J. A. NOBLE & Co. to ROYAL GARDENS, KEW.

136, Fenchurch Street, London, E.C.,
September 6, 1895.

DEAR SIR,

WE are favoured with your letter of the 3rd instant, with sample of Lagos Rafia. We are desirous of showing this to the consumers as well as to the dealers. With the latter there will be difficulty in getting them to put it forward in the place of the Madagascar Rafia, as it is not so sightly and the smaller buyers will prefer the broader and lighter colour. Our own opinion is that with more care in the preparation it will come into use with those who do not look to colour so much as strength. We see no reason why it may not be broader, as it has simply been allowed to curl up in the preparation, and is consequently harsh, with a tendency to cut in the using. It is certainly the strongest we have seen from the West Coast; what we have seen before has been soft and good colour, but very tender and unsaleable.

We will write you again after we have given the consumers an opportunity of testing it and have received their opinion upon it. In the meantime, Mr. Millen should continue his experiments, and we feel no doubt he will be able to improve considerably on this sample. There is very little doing at the present time, and prices have fallen back from 48*l.* per ton to 32*l.* nominal. We consider this should sell at about 20*l.* per ton on the basis of 32*l.* for the Madagascar.

Yours truly,
(Signed) J. A. NOBLE & Co.

D. Morris, Esq., C.M.G., D.Sc.,
Royal Gardens, Kew.

As already mentioned small shipments of West African Rafia have been made, from time to time, for many years, but no commerce has arisen in it owing to its unfavourable character as compared with Madagascar Rafia. The natives all along the coast manufacture cloths, mats, baskets, and hammocks from Rafia, and samples are in the Kew Museums from the Gambia, Sierra Leone, Gold Coast, and Old Calabar.

Further specimens of Rafia from West Africa were brought to Kew recently by Mr. Walter Haydon, Curator of the Botanic Station at the Gambia. The plant yielding these has not yet been determined. It is evidently a species of *Raphia*, but different in the fruit from any *Raphia* so far represented at Kew. Mr. Haydon's specimens of Rafia were soft in texture and of good colour, but rather short. They were, however, superior to any specimens previously received from West Africa. The following Report shows also, that they were valued commercially at a higher price than any former specimens :—

Messrs. IDE and CHRISTIE TO ROYAL GARDENS, KEW.

72, Mark Lane, London, E.C.,
November 14, 1895.

DEAR SIR,

REGARDING the sample and letter dated 13th from the Royal Gardens duly to hand, we beg to say that for colour and texture, this is the best Rafia we have seen from the West Coast of Africa, and in these respects equal to the Madagascar product. The uncut ends, shortness and fine points all are against the sale and would interfere both with sale and value.

As it is we put it about 20*l.* to 25*l.* per ton. A small shipment of the usual West Coast we sold a few days ago at 25*l.*

Yours faithfully,
(Signed) IDE and CHRISTIE.

D. Morris, Esq., C.M.G., D.Sc.,
Royal Gardens, Kew.

CCCCLXXXVII.—DIAGNOSES AFRICANÆ, IX.

The small collection, of which the following are the new species, was made by Mr. Alexander Carson in 1894, opposite the south end of Lake Tanganyika. The novelties of his previous collections in the same region are described in "Diagnoses Africanæ," IV. (*Kew Bulletin*, 1895, pp. 63–75). Lake Mwero is about a hundred miles long, and is situated about a hundred miles west of the south end of Tanganyika. It is 2,900 feet above sea-level, and the Kalongwizi river runs into it from the east. A good map of the district will be found in the *Proceedings of the Royal Geographical Society* (vol. xiv., 1892), illustrating a paper by Mr. Alfred Sharpe. It belongs to the South Central region, as defined in Oliver's *Flora of Tropical Africa*, the botany of which is still almost entirely unknown. The whole collection contains between 40 and 50 species.

401. **Boscia Carsoni,** *Baker* [Capparideæ]; fruticosa, ramosissima, glabra, foliis distincte petiolatis oblongis obtusis basi cuneatis coriaceis utrinque pallide viridibus, floribus in racemos densos multifloros termi-

nales dispositis, pedicellis erecto-patentibus calyce longioribus, sepalis oblongis persistentibus post anthesin reflexis, staminibus circiter 15 calyce paulo longioribus antheris parvis oblongis, gynophoro staminibus æquilongo, ovario ovoideo stigmate sessili peltato.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 37 of 1894 collection.

Folia 1½–2 poll. longa, medio 12–14 lin. lata. *Sepala* 2 lin. longa. *Fructus* ignotus.

Near *B. senegalensis*, Lam.

402. **Ochna floribunda**, *Baker* [Ochnaceæ]; fruticosa, ramulis lignosis glabris, foliis breviter petiolatis oblanceolato-oblongis ciliatis glabris e medio ad basin sensim attenuatis post anthesin maturis, cymis multis sessilibus umbellatis multifloris, bracteis parvis congestis ovatis membranaceis, pedicellis calyce longioribus, sepalis oblongis obtusis rubrobrunneis glabris post anthesin reflexis, petalis obovato-cuneatis calyce paulo longioribus, filamentis brevibus antheris magnis linearibus, stylo elongato.

Habitat.—Near Lake Mwero, west of Lake Tanganyika, *Carson*, 8 of 1894 collection.

Sepala 2½ lin. longa. *Petala* 3 lin. longa. *Fructus* ignotus.

Near *O. leptoclada*, Oliver.

403. **Dolichos platypus**, *Baker* [Leguminosæ]; herbaceus, perennis, caule stricto erecto, stipulis linearibus rigidis persistentibus, petiolo late alato alis rigidulis basi cordatis apice rotundatis stipellis mucronatis persistentibus, foliis simplicibus oblongo-lanceolatis acutis rigidulis glabris, floribus paucis laxe racemosis, pedicellis erecto-patentibus pubescentibus calyce longioribus, calycis tubo brevi campanulato dentibus tubo longioribus superioribus deltoideis inferioribus lanceolatis, petalis glabris rubellis calyce duplo longioribus, ovario cylindrico multiovulato.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 11 of 1894 collection.

Caulis sesquipedalis. *Alæ* petiolorum 2 poll. longæ, 5–6 lin. latæ. *Folia* 3–4 poll. longa, 10–12 lin. lata. *Calyx* 3 lin. longus. *Vexillum* 6–8 lin. longum.

A very curious species, nearly allied to *D. pteropus*, Baker, in *Kew Bull.*, 1895, p. 66.

404. **Kalanchoë pilosa**, *Baker* [Crassulaceæ]; annua, caule erecto pilis mollibus brevibus subtilibus albis patulis vestito, foliis sessilibus oblongo-lanceolatis acutis integris utrinque pilosis, floribus in paniculam amplam dispositis ramis erecto-patentibus apice dense cymosis, pedicellis brevibus pilosis, calycis campanulati pilosi lobis ovatis tubo æquilongis, corollæ pallide luteæ tubo calyce triplo longiore dimidio superiore cylindrico dimidio inferiore dilatato, limbi segmentis obovato-cuneatis, genitalibus in tubo inclusis, staminibus biseriatis prope medium tubi insertis.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 3 of 1894 collection.

Caulis pedalis et ultra. *Folia* caulina 1—1¼ poll. longa. *Calyx* 2 lin. longus. *Corollæ* tubus 6 lin longus; limbus expansus 4 lin. diam.

Near *K. glandulosa*, Hochst.

405. **Combretum (Poivræa) mweroense,** *Baker* [Combretaceæ]; ramulis dense pubescentibus, petiolis brevissimis dense pilosis, foliis oblongis acutis basi breviter cordatis utrinque dense pubescentibus, floribus pentameris dense cymosis, calycis tubo subcylindrico dense piloso dentibus parvis lanceolatis, petalis parvis viridibus, staminibus longe exsertis, fructu oblongo obtuso ad basin attenuato angulis late alatis.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 37, in part, of 1894 collection.

Folia 2 poll. longa. *Calycis* tubus 8 lin. longus. *Stamina* quam calyx 5–6 lin. longiora. *Fructus* 18 lin. longus.

406. **Pentas modesta,** *Baker* [Rubiaceæ]; annua, herbacea, caule erecto ramoso, ramulis pubescentibus, stipulis conspicue ciliatis, foliis linearibus acutis glabris integris sessilibus ad basin attenuatis, cymis terminalibus laxis paucifloris, pedicellis brevissimis, ovario demum glabro, dentibus calycinis linearibus subæqualibus persistentibus fructui æquilongis, corollæ tubo cylindrico dentibus calycinis paulo breviore, fructu subgloboso.

Habitat.—Kalongwizi river, Mwero, west of Lake Tanganyika, *Carson*, 33 of 1894 collection.

Folia centralia 2 poll. longa, 3–4 lin. lata. *Dentes calycini* demum 2½ lin. longi. *Corollæ* limbus expansus 4 lin. diam.

407. **Vernonia subaphylla,** *Baker* [Compositæ]; perennis, caule erecto parce ramoso pubescente ad collum radicis dense lanoso, foliis paucis parvis linearibus sessilibus integris subcoriaceis pilosis facie canaliculatis, capitulis ad apices ramorum solitariis multifloris, involucro campanulato, bracteis obtusis imbricatis adpressis pilosis exterioribus sensim brevioribus interioribus margine membranaceis rubellis, floribus rubro-purpureis, acheniis angulatis pubescentibus, pappo albido setoso corollæ tubo breviore.

Habitat.—Kalongwizi river, Mwero, west of Lake Tanganyika, *Carson*, 10 of 1894 collection.

Caulis pedalis. *Folia* 6–12 lin. longa. *Involucrum* 6 lin. longum. *Pappus* 3 lin. longus.

408. **Senecio (Kleinia) mweroensis,** *Baker* [Compositæ]; caule brevi cylindrico carnoso inermi, foliis minutis linearibus integris acutis carnosis, pedunculis nudis erectis strictis elongatis, capitulis homogamis multifloris, involucro oblongo bracteis circiter 12 lanceolatis glabris æqualibus, pappo molli albo corollæ tubo æquilongo, limbi lobis luteis lanceolatis.

Habitat.—Kalongwizi river, Mwero, west of Lake Tanganyika, *Carson*, 15 of 1894 collection.

Pedunculi 4–6 poll. longi. *Involucrum* 10 lin. longum, 6 lin. diam. *Pappus* 10–11 lin. longus.

Near *S. Anteuphorbium*, Sch. Bip.; *Bot. Mag.* tab. 6099.

409. **Dicoma quinquenervia,** *Baker* [Compositæ-Mutisiaceæ]; perennis, caule simplice stricto erecto elongato tenuiter albo-incano, foliis caulinis distantibus linearibus vel lanceolatis integris subcoriaceis basi caulem vaginantibus facie viridibus dorso albo-incanis, e basi supra medium conspicue quinquinerviis, capitulis paucis magnis aggregatis,

involucro campanulato bracteis omnibus adpressis linearibus acuminatis subcoriaceis albidis nitidis exterioribus sensim brevioribus, pappo molli albo multiseriali dense plumoso corollæ tubo æquilongo.

Habitat.—Hills near the Chama River, Mwero, west of Lake Tanganyika, *Carson*, 4 of 1894 collection.

Caulis 1½–2 pedalis. *Folia* centralia semipedalia, 12–18 lin. lata. *Involucrum* 15–16 lin. longum. *Pappus* 6 lin. longus.

Near *D. sessiliflora*, Harv.

410. **Ipomœa (Strophipomœa mweroensis**, *Baker* [Convolvulaceæ]; caule gracili volubili pilis subtilibus patulis vestito, foliis patulis distantibus integris cordato-ovatis acutis facie viridibus obscure pilosis dorso vinoso-purpureis magis pilosis, cymis 2–3-floris breviter pedunculatis, pedicellis elongatis, bracteis parvis lanceolatis, sepalis ovato-lanceolatis æqualibus pilosis, corollæ albæ infundibularis limbo patulo vix lobato extus fasciis 5 pubescentibus percurso, staminibus brevibus prope basin tubi insertis.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 23 of 1894 collection.

Folia 15–18 lin. longa. *Calyx* 3–4 lin. longus. *Corolla* 15 lin. longa, limbo expanso 15–18 lin. diam.

Near *I. obscura*, Ker.

411. **Ipomœa (Strophipomœa) pharbitiformis**, *Baker* [Convolvulaceæ]; caule volubili gracili adpresse pubescente, foliis breviter petiolatis cordato-ovatis integris acutis facie viridibus parce pilosis dorso pilis mollibus adpressis pallide brunneis dense persistenter vestitis cymis 5–6-floris breviter pedunculatis, pedicellis brevibus, bracteis magnis ovato-lanceolatis pilosis, sepalis ovato-lanceolatis acutis æqualibus imbricatis pilosis, corollæ saturate rubro-purpureæ limbo vix lobato, staminibus brevibus prope basin tubi insertis.

Habitat.—Mwero, west of Lake Tanganyika, *Carson*, 41 of 1894 collection.

Folia 2–3 poll. longa. *Sepala* 4½ lin. longa. *Corolla* 18 lin. longa, limbo expanso 15–18 lin. diam.

Near *I. Lindleyi*, Choisy.

412. **Coleus punctatus**, *Baker* [Labiatæ]; perennis, caulibus validis erectis elongatis pubescentibus, foliis longe petiolatis ovatis acutis inciso-crenatis membranaceis basi late rotundatis utrinque viridibus pubescentibus dorso copiose minute nigro-punctatis, cymis multifloris subracemosis in paniculam subdensam oblongam dispositis, pedunculis pedicellisque pilosis, calycis tubo brevissimo dense piloso dentibus ovatis supremo multo majore, corollæ tubo supra medium decurvato ampliato, labio superiore parvo erecto, inferiore saccato unguiculato, staminibus labio inferiore æquilongis.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 25 of 1894 collection.

Petioli 2–2½ poll. longi. *Folia* 3–4 poll. longa, 2–2½ poll. lata. *Panicula* semipedalis. *Calyx* fructiferus 2 lin. longus. *Corolla* 9 lin. longa.

413. **Coleus leucophyllus**, *Baker* [Labiatæ]; perennis, caule stricto erecto elongato persistenter albo-incano, foliis breviter petiolatis oblongis subacutis crenatis basi cuneatis facie tenuiter dorso dense persistenter albo-incanis, racemis compositis in paniculam amplam densam dispositis, cymis multifloris distincte pedunculatis, pedicellis brevibus pubescentibus, bracteis parvis caducis, calycis pubescentis tubo campanulato dentibus omnibus ovatis acutis supremo majore, corollæ tubo supra medium decurvato ampliato, labio superiore parvo erecto trilobato, inferiore magno profunde saccato longe unguiculato, staminibus labio inferiori æquilongis.

Habitat.—Near Mwero, west of Lake Tanganyika, *Carson*, 26 of 1894 collection.

Caulis tripedalis. *Folia* inferiora 3–4 poll. longa, medio 18–21 lin. lata. *Panicula* subpedalis. *Calyx* floriferus 3 lin. longus. *Corolla* 12–15 lin. longa.

414. **Plectranthus (Isodon) primulinus**, *Baker* [Labiatæ]; perennis, ramis sublignosis elongatis, foliis hysteranthiis ignotis, racemis brevibus densissimis in paniculam oblongam vel globosam congestis, pedicellis brevissimis, calycis dense pilosi tubo campanulato dentibus linearibus æqualibus tubo longioribus, corollæ pallide luteæ extus pilosæ tubo curvato calyce paulo longiore, labio superiore parvo erecto, labio inferiore majore orbiculari saccato, staminibus labio inferiori æquilongis.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 36 of 1894 collection.

Paniculæ 1½–2 poll. longæ. *Calyx* demum 2 lin. longus. *Corolla* 3 lin. longa.

Near *P. densus*, N. E. Brown, in *Kew Bulletin*, 1894, p. 12.

415. **Scutellaria paucifolia**, *Baker* [Labiatæ]; perennis, cæspitosa, caulibus brevibus dense albido-pubescentibus, foliis paucijugis sessilibus vel breviter petiolatis ovatis obtusis integris vel obscure crenulatis viridibus vel purpureo tinctis utrinque pubescentibus, racemis simplicibus laxis terminalibus paucifloris vel multifloris, foliis floralibus parvis ovatis persistentibus, pedicellis ascendentibus pilosis, calycis valde accrescentis tubo campanulato pubescente dente supremo magno orbiculari reliquis minoribus obtusis, corollæ tubo pubescente calyce triplo longiore lobis brevibus latis, genitalibus inclusis.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 12 of 1894 collection. Lower plateau of Lake Nyassa, *Thomson*.

Caules 3–5 poll. longi. *Folia* inferiora 3–4 lin. longa *Calyx* floriferus 2 lin. longus. *Corolla* 7–8 lin. longa.

416. **Loranthus (Dendrophthoë) mweroensis**, *Baker* [Loranthaceæ]; ramulis validis teretibus glabris, foliis distincte petiolatis oblongis subobtusis basi rotundatis coriaceis utrinque viridibus glabris venis primariis gracilibus ascendentibus, cymis lateralibus multifloris breviter pedunculatis, pedicellis brevissimis, bracteis late ovatis calyci æquilongis, calycis campanulati parvi glabri ore truncato, corollæ tubo elongato cylindrico limbo ante anthesin globoso lobis late ovatis.

Habitat.—Mwero plateau, west of Lake Tanganyika, *Carson*, 27 of 1894 collection.

Petioli 9–12 lin. longi. *Folia* 3–4 poll. longa, medio 1½–2 poll. lata. *Calyx* ¾ lin. longus. *Corollæ* tubus 15 lin. longus: lobi 1½ lin. longi.

Near *L. Braunii*, Engler.

417. Gladiolus (Eugladiolus) erectiflorus, *Baker* [Irideæ]; caule gracili glabro elongato, foliis caulinis 2–3 linearibus glabris elongatis rigide subcoriaceis, spica laxa simplice multiflora, spathæ valvis lanceolatis parvis scariosis, floribus erectis albis venis rubro-purpureis pulchre decoratis, perianthii tubo anguste infundibulari segmentis oblongo-spathulatis subobtusis tubo æquilongis inferioribus angustioribus, staminibus segmentis superioribus paulo brevioribus.

Habitat.—Liendwe, west of Lake Tanganyika, *Carson*, 1 of 1894 collection.

Cormus ignotus. *Folia* pedalia vel sesquipedalia, 3–4 lin. lata. *Valva* exterior 12–15 lin. longa. *Perianthium* 2–2¼ poll. longum.

Near *G. Grantii*, Baker.

CCCCLXXXVIII.—SUMACH.

(*Rhus Coriaria*, L.)

There are three sorts of sumach known in commerce. Venetian sumach, or young fustic, consists of the twigs of *Rhus Cotinus*, a southern European species. This yields a beautiful bright yellow dye, much used in calico printing. North American sumach is yielded by *Rhus glabra*. The fruit, leaves, and bark of this tree are used for their astringent properties in tanning leather. The sumach of the Mediterranean region, and the one more widely used, consists of the powdered leaves only of *Rhus Coriaria*, a hardy shrub growing on rocky slopes in Sicily and elsewhere. An interesting account of the cultivation of sumach in the vicinity of Colli, near Palermo, is translated by Colonel H. Yule, C.B., in the *Transactions of the Botanical Society of Edinburgh* (Vol. IX., pp. 341–355), from an article by Professor Inzenga.

The branches of the sumach are cut with a pruning hook or knife of a peculiar shape, called a "ronco," while the leaves after drying in the fields, are threshed with a flail called a "bovillo." These implements were obtained for the Kew Museums with the kind assistance of the Foreign Office, in 1885. (*Pharm. Journ.*, XV. [3], p. 852.)

The sumach plant has been successfully introduced to Australia, and is said to thrive well in the dry plains of the Wimmera district. Sumach from Melbourne plants was shown at the Exhibition of 1863.

In a report by the U.S. Consul at Palermo, dated November 12, 1884, it is stated that the plant attains a height of about 3 feet. It is a shrub with small oval leaves about an inch long. The most favourable locality for the cultivation of the plant is rocky soil on the slopes of hills such as those about Palermo, which are covered with it. The growth of the plant begins in spring, and it ripens its leaves about August. When the sumach is cut, it is spread on the field to dry, the leaves are then broken from the stems, packed in bags, and conveyed to the mills.

"The first process to which it is subjected in the mill is that of cleaning, which consists of placing it in the 'ventila'—a kind of sieve—

to separate from it dirt, stones, snail shells, &c. This is accomplished by a strong current of air induced by hydraulic pressure. The second process is that of grinding, which is similar in many respects to the old way of grinding grain. The third process consists in placing the result of the second in a large sieve, the holes in which are graduated to suit the taste of the country to which it is intended to export the sumach; that for the United States being more finely ground than any other country, the United States preferring fine sumach, and other countries a coarser article."

A recent account of the trade in sumach, which constitutes one of the most important industries in Palermo, is contained in a Foreign Office Report (Annual Series, 1895, No. 1544) by Vice-Consul De Garston of Palermo :—

He states that real sumach, which is known in Sicily as "sommacco forte," or "mascolino," is a hardy shrub which grows upon available patches of ground on the hillsides and the slopes of the mountains. It does not require a good soil, but, on the contrary, is generally found flourishing in the most stony and apparently poor ground. The plant attains a height of about 1½ feet from the ground, and the leaves closely resemble those of the oak. The harvesting takes place during the months of July, August, and September.

This species of sumach is locally known as "strong" (owing to the greater per-centage of tannin which it yields) in contradistinction to the similar plant known as "sommacco femminello," called also Catania sumach, although in point of fact it is not limited to the province of Catania, but, on the contrary, is very common throughout the whole of the province of Palermo.

The leaves of the latter (femminello) are smaller and of much less strength than those of the former plant, and are, therefore, of considerably less value. They are consequently largely used in the adulteration of the ground sumach.

Two other plants which closely resemble each other, and are named respectively "bruca" and "stinco," are largely used in the sumach trade to adulterate the genuine article. They rise to the height of small trees, and have no leaf, properly speaking. In lieu of the leaf they have prickly little shoots, which thickly cover the lesser branches, and which, after being collected, are ground up and mixed with the product of the true sumach plant. These very inferior articles always contain a large proportion of earth, owing to the impossibility of making them undergo a process of ventilation.

Pure sumach, on the other hand, is capable of being ventilated, and is, in fact, invariably submitted to that operation, and thus freed from much of the impurity in the shape of the native soil, which finds its way into the mills together with the leaf, having been taken up during harvesting.

Of late years there has been a continued falling-off in the quantity of sumach exported, both as regards "leaf" and "ground," the demand being much slacker than formerly. This falling-off in the demand may be a natural sequence of the ever-increasing adulteration in the article, which is now carried on to a great extent, and made a fine art of. What formerly went forward under the name of sumach was really the product of the real plant, with a very small addition of undefined vegetable product; what is now sold as sumach is a mysterious vegetable compound with an infinitesimal quantity of sumach added thereto.

Whether the adulteration which now goes on is a result of the increasing competition all round, and an attempt to sell at anything near the prices offered, or whether it is due to the class of dealers into whose hands the sumach trade has now fallen, is a question which will admit of a great deal of argument.

In 1894 the amount of sumach, ground and in leaf, exported from Palermo to the United Kingdom amounted to 3,469,053 kilos., in round numbers, say, 3,400 tons, and the approximate value of same amounted to 693,810 lire, or in sterling, at exchange 26·50 lire, to 26,181*l.*, whilst the total export of sumach to all countries during same period was 25,562,397 kilos., or about 25,000 tons, of which France alone took some 10,000 tons, mostly in leaf, and America 5,500 tons, Germany coming next with 3,265 tons, or very nearly as much as was taken by Great Britain. The approximate value of all the sumach exported from Palermo to all countries during 1894 was 5,112,479 lire, or in sterling 192,923*l.* 14*s.* 8*d.* at 26·50 lire exchange.

After the sumach leaf has been subjected to the first process of trituration, there remains a certain amount of coarse stuff; this is ground over again, and the product is added to what has been already obtained. Still there is left a certain residuum of unground leaves, stalks, &c., and this residuum is technically known in Sicilian as "peduzzo." The name given to the small stalks branching from the main root of the sumach plant, and to which the leaves are directly attached, is "gambuzzo." These also receive a degree of grinding, and the result is added to the aforesaid "peduzzo" before the latter has been re-ground, but not before it has been sifted, and the coarser ungrindable part set aside to be utilised in its turn as additional and auxiliary fuel in the furnaces.

The price of sumach is generally at its lowest during and immediately after harvesting, when, very naturally, the peasant proprietors are anxious to realise, not being able to defer handling their money and wait for a rise, which is very nearly certain to take place later in the season. It is at this period that the speculator steps in and buys up all that his means will allow, to be stored and locked up till the anticipated rise takes place.

Very frequently the price reached is not sufficiently tempting to induce the holder to part with his stock, in which case the stock will remain on hand till next season, and come on the market together with the new crop. The buying and selling of sumach and its kindred plants is wholly conducted on the basis of the obsolete weights and moneys of Sicily, so many tarì for the cantar of sumach. A tarì is worth 42½c., or, say, 4½*d.*, and 30 tarì go to the "onza," or 12·75 lire, equal to our half sovereign. The cantar weighs exactly 79·342 kilos., being equal to 100 rotoli of 800 grammes each, within a fraction, that is to say, about 2lbs. English.

Although all the transactions in sumach are calculated on the basis of these ancient weights and coins, yet no such moneys are actually in circulation, consequently every calculation has to be reduced again to the decimal system, the currency here, as elsewhere in the kingdom of Italy, being lire and centesimi.

The value of sumach, of course, varies considerably according to the demand and the season.

Last year's prices ruled about 41 to 42 tarì per cantar, or, say, about 21·96 to 22·50 lire per quintal (100 kilos.) delivered free at the mills. These figures, of course, refer to the genuine strong (mascolino) sumach from the best districts. Femminello would be worth about 4 tarì less per cantar; and bruca would sell for, say, 14 to 18 tarì per cantar; stinco from 4½ to 6 lire, and so on. English readers may like to be reminded that the Italian lira is worth about 9*d.* at the present rate of exchange.

Absolutely pure sumach should contain from 30 to 32 per cent. of tannin, determined by the oxalic acid method, or 20 to 22 per cent. tannin as gallo-tannic acid. Pure femminello, on the other hand, would only contain from 22 to 26 per cent. of tannin (oxalic acid), and 16 to 18 per cent. tannin, as gallo-tannic acid. However, perfect purity in sumach is only a chemical expression; it never appears on the market. A satisfactory quality, and one of greater strength than is generally sold, would be two-thirds of genuine strong sumach and one-third femminello, and this should give an average of about 29 per cent. tannin (oxalic acid) and 20 per cent. of tannin as gallo-tannic acid (when properly ground and mixed). The following figures show the value of sumach exported to the United States from Palermo for the year 1894:—

Date.	Value. $	c.
Quarter ending—		
March 31st - - - - - -	89,614	78
June 30th - - - - - -	51,853	12
September 30th - - - - -	40,132	50
December 31st - - - - - -	109,473	78
Total - - -	291,074	18

The last paragraph of the above report has been slightly modified in expression. It is still, however, at first sight not quite intelligible.

Professor Church, F.R.S., has obligingly furnished the following explanation:—"I find that the amount of potassium permanganate required to oxidise 41·6 grams. of gallo-tannic acid is capable of oxidizing 63 grams of oxalic acid. I think that the lower figures in the report were calculated from the oxalic acid figures by reducing them by one-third. The method adopted may be stated thus: 100 parts by weight of sumach are capable of reducing the same amount of permanganate as 30 parts of oxalic acid; it is calculated that this figure corresponds to 20 parts of gallo-tannic acid."

CCCCLXXXIX.—LIBERIAN COFFEE.

A note with the most recent information on Liberian coffee was published in the *Kew Bulletin*, 1895, p. 273. This also contained a list of articles that have appeared on the subject in the *Bulletin* during the last five years. Where suitable facilities do not exist at the place of production for cleaning Liberian coffee the following information in regard to cleaning it in London will be useful to planters. Messrs. Major and Field, who have favoured Kew with a letter on the subject, have had considerable experience in dealing with shipments of Liberian coffee to this country:—

Messrs. Major and Field to Royal Gardens, Kew.

Red Lion and Three Cranes Wharf,
Upper Thames Street,
London, E.C., November 14, 1895.

Dear Sir,

As our letter to you of the 3rd pointed out, the reference in our letter of March 1892, published in the *Kew Bulletin* (1893, pp. 130–132), was only to shipments of Liberian coffee in the cherry, and not to shipments of Liberian coffee in parchment at all.

We have carefully read the interesting article on Liberian coffee on pp. 261–263 of the *Kew Bulletin* of 1888, which contains Messrs. Lewis and Peat's letter, and we think it is quite compatible with the belief that "it is probable that, under many conditions, being able to ship the coffee in parchment is a facility of considerable importance to growers."

Messrs. Lewis and Peat say in their letter of October 1888, "We certainly think if such results can be obtained on the other side, as shown by your sample from the Tan Hun Guan estate, at Durian Tungal (Malacca), it would be folly to send the coffee home here in parchment." This remark is on the assumption that it is possible to send the produce of estates forward in the same condition as the sample. It has to be borne in mind, however, that a mere sample weighing only a few pounds can be prepared with an amount of attention and care which it may often be commercially impracticable to bestow on an entire crop, and we have in mind the difficulty that cultivators so often experience in preparing their crop (after they have perhaps grown it in the best possible way) to suit the fancy of the buyers.

As regards the remark that "the parchment of this coffee gets very hard and difficult to clean when left long before cleaning," there is no doubt that Liberian parchment is far more difficult to deal with than parchment of the Arabian type, but as the coffee has to be thoroughly dry whether it is cleaned here or abroad, we do not think the parchment really becomes any harder when left long before cleaning, or that the coffee is more difficult to work than it otherwise would have been The remark would, however, undoubtedly apply to Liberian coffee dried in the cherry, as the cherry husk then becomes exceedingly hard, very much indeed like the shell of a nut, and it was knowledge of this fact, and that coffee forwarded in cherry naturally shows a far higher per centage of loss for shell than coffee sent forward merely in the parchment, that led us to speak so strongly in our letter of March 1892 (*Kew Bulletin*, 1893, pp. 130–132) against shipments of Liberian coffee in cherry. As regards the parcel of Johore Liberian, referred to by Messrs. Lewis and Peat as not having turned out satisfactorily, the fact that it had not been properly dried and was consequently musty, would be sufficient to account for the bad result, as if growers failed to pulp, wash, and dry their produce properly, it is impossible for any amount of care, either on this or the other side, to afterwards remedy the defect.

During the last year or so small lots of Liberian parchment coffee from the west coast of Africa have been sent to us for husking, all of which have been treated without difficulty, and in September last we received a parcel of Borneo Liberian from Messrs. Shand, Haldane, & Co., of 24, Rood Lane, E.C., the secretaries in London of the Borneo Coffee Company, Limited. These gentlemen have furnished us with information as to prices obtained, &c., so that we are able to give fairly full particulars concerning this parcel.

We understand it is the first shipment from the Taritipan estate of the company in British North Borneo, and consisted of B. C. and Co., Limited, 43 bags parchment coffee, and three bags cleaned coffee, which arrived per "Telamon" SS. at Singapore, ex "Banjermassin" SS. at Kudat, Borneo. Messrs. Shand, Haldane & Co., at the time they handed us the Borneo Liberian with instructions to warehouse and clean the coffee, informed us that they anticipated a rather rough out-turn, as it had been collecting for some time, and the pulpers not having arrived out there, the means of pulping were not adequate. On landing the parcel, we found that there were two distinct qualities of parchment, 17 bags being clean and bright parchment, and 26 bags very rough and dingy, and though we have not full information on the subject, we think there can be little doubt that the latter was some of the first to be gathered, and that the treatment was not thoroughly understood at the time. The two parcels were husked separately, and the 26 bags were found to be much the same style of coffee as the three bags that had been cleaned abroad. The out-turn after husking, sizing, &c., with the prices realised in bond, were as follows:—

——	Net Out-turn.			Price per Cwt.	
	Cwts.	Qrs.	Lbs.	s.	d.
Ex 17 bags:—					
Bold	8	2	3	89	0
Medium	0	2	25	70	0
Bold peaberry	0	3	16	75	0
Ex 26 bags:—					
Bold	11	1	18	75	6
Medium	1	0	26	60	0
Bold and small peas, with small peas ex the 17 bags.	2	0	5	70	0
Triage:—					
Ex 17 bags	0	0	19	50	0
Ex 26 bags	0	1	7		
3 bags cleaned abroad	3	1	25	70	0

The loss in weight on the 43 bags after husking was 32·6 per cent. For purposes of comparison, it will, perhaps, hardly be fair to take account of the 17 bags, as they were so much better in quality than either of the other lots; but, as a rough comparison, the 26 bags may be contrasted with the three bags cleaned abroad. The average price of the 15 cwt. of the former works out at 72*s.* 11*d.* per cwt. against 70*s.* per cwt. realised by the latter, and although we do not pretend that the result of one parcel can be considered conclusive evidence either one way or the other, yet we think it fairly justifies the conclusion that under many conditions being able to ship in parchment may be of considerable importance to producers. That the best pile in the parcel fetched 89*s.* per cwt proves that Liberian parchment coffee can be thoroughly well treated over here. The price we charge for cleaning Liberian parchment coffee is 3*s.* 9*d.* per cwt., as against 2*s.* 6*d.* per cwt. for Arabica parchment, the operation being very much more difficult, and the charge includes all the London warehouse charges that would be incurred if the coffee were sent over after having been cleaned abroad.

Whether it is worth while shipping Liberian coffee in parchment is a question that at least at present we think each individual grower must decide for himself, being guided by local conditions and the circumstances of his own case. A certain amount of labour would be saved which on new estates, and where the labour supply is not plentiful, would be of considerable importance, the hands being set free for other work on the estate. The Europeans in charge would be able to look after the general work of the place, instead of having to superintend the cleaning operations, with the working of which many of them may be only very imperfectly acquainted. The capital outlay on machinery is reduced, and risks of breaking down avoided. This latter consideration must be most important when the coffee is being cultivated, as it so frequently is, in countries where no engineering shops exist, necessitating even trivial repairs being executed in England. The crop can also probably be shipped a good deal earlier than if it has to be husked on the estate. A disadvantage is that of freight having to be paid on an increased weight. Of course it is absolutely essential that as much care should be taken in the pulping, washing, and drying of coffee intended for shipment in parchment as if it was going to be treated on the spot, otherwise successful results cannot be expected. In this connection we think the paragraph on page 262 of the *Bulletin* for 1888, mentioning that in Java the Liberian coffee cherries are fermented before they are pulped, which it is claimed enables the coffee to be more readily cleaned, and produces coffee brighter in colour and of better quality, is well worth impressing on growers again, so that they may take steps to verify the correctness of this statement, as this possibly accounts for some of the coffee received being a nice bright yellow colour and comparatively free from silver skin, while some is extensively coated with the latter and is dingy and dull in appearance.

In conclusion, we may say we are sure Messrs. Shand, Haldane, & Co. would answer any inquiries you might like to make with reference to the Borneo coffee, and we shall be glad to give you any further information in our power on the subject.

We are, &c.
(Signed) MAJOR AND FIELD.

The Director,
Royal Gardens, Kew.

CCCCXC.—MISCELLANEOUS NOTES.

The Director of the Royal Gardens represented the Royal Society at the funeral of M. PASTEUR in Paris on October 5.

Botanical Magazine.—The October number opens with *Anthurium Gustavi*, a native of Cauca, Colombia. It was first sent to Kew from Herrenhausen by Dr. Wendland in 1887, but this plant has not flowered; subsequently it was received from Messrs. Sander & Co., of St. Albans, and this plant flowered last year. It is a striking species with huge cordate leaves and long, narrow, deep purple spathes. *Mormodes rolfeanum*, a native of Peru, is a handsome orchid, which flowered at Kew in January of the present year. *Polygala Galpini*, a South African species, with flowers recalling those of *Indigofera decora*. It was raised from seeds sent to Kew by Mr. Galpin in 1889. *Tulipa violacea*, a Persian species, which, in spite of its name, has not violet flowers, though they are of a much richer, brighter hue than they are represented in the figure. It was flowered at Kew from bulbs presented by Mr. Max Leichtlin, of Baden-Baden. *Sternbergia fischeriana* is a spring-flowering species, very similar to *S. lutea*. Bulbs were received at Kew last year from Messrs. Dammann, of Naples, and from Mr. E. Whittall, of Smyrna, near which place they were collected by the latter gentleman.

Index Kewensis.—In the *Bulletin* for 1893, p. 342, the publication of the first part of this important compilation was announced, and some particulars given of its history, scope, and probable date of completion. Happily nothing has occurred to impede the progress of the work, and the last part is in the hands of botanists, within the period originally estimated for passing it through the press. Sir Joseph Hooker and Mr. Daydon Jackson, the principal labourers, are to be heartily congratulated on the accomplishment of this great and arduous undertaking, in which the resources of Kew have played so important a part. As already explained, this index covers the period from the establishment of binominal nomenclature by Linnæus in 1753 down to the end of 1885. This leaves ten years, and ten very active years, of botanical work still unindexed; but it is satisfactory to know that a supplement covering this decade is in a forward state of preparation. M. Th. Durand, of the Royal Herbarium, Brussels, began this supplement some years ago, and even offered the first five years of it to the editors of the *Index Kewensis* for incorporation in that work, but the offer was declined because acceptance would have delayed publication and interfered with the original plan. Steps were taken, however, to encourage and assist M. Durand, and arrangements are in progress for publishing the supplement uniformly with the *Index* itself. Mr. Daydon Jackson is now actively assisting M. Durand, and it is hoped that they will be able to publish during the course of next year.

Kew System of Greenhouse Construction.—The periodical reconstruction of the houses in which plants are grown under glass is a serious drawback to this method of cultivation. It is, however, practically impossible to avoid it as long as wood is employed, as that material sooner or later inevitably decays under the humid conditions to which it is necessarily exposed. To obviate this difficulty iron has for some years been freely used in the construction of greenhouses at Kew. Ordinary T iron is used for the rafters. The sashes which can be easily replaced at any time, if they become decayed, rest conveniently on the arms of the inverted T.

This method of construction has proved perfectly successful, and the Conservatory, No. IV., as well as the Temperate Fern House, No. III., are good examples of the method.

The merits of the system have not escaped the attention of the horticulturists of other countries. The Royal Board of Works and Buildings, Munich, and the Board of Commissioners of the Zoological Gardens, Rotterdam, have severally applied for detailed working drawings of the mode of construction employed in the Kew houses. And these have been furnished accordingly by the First Commissioner of Her Majesty's Works and Public Buildings.

Rosa wichuraiana.—This very distinct and ornamental rose, which has lately been the subject of much praise in the gardening journals, has recently been figured in the *Botanical Magazine* (plate, 7421), under the name of *R. Luciæ*, with which species it was formerly associated, when only known from dried specimens. The reduction has been the cause of some questions being addressed to Kew, and it may, therefore, be useful to give the history of the name *wichuraiana.* It was originally given by the eminent rhodologist, Fr. Crépin, to a specimen in the Berlin Herbarium, but abandoned by himself in favour of the name *Luciæ*, first published in the *Bulletin de la Société Royale de Botanique de Belgique* (x., 1871, p. 324), on the assumption that it was the same species. Consequently it has since been cited by many writers as a synonym, without further investigation, though Crépin restored it (*Bull. Soc. Roy. Bot., Belg.*, x., p. 189) to specific rank in 1886. Botanically there is not much to separate *R. multiflora*, *R. Luciæ*, and *R. wichuraiana*, though the habit of the latter is extremely different.

Another point has arisen in connection with the figure in the *Botanical Magazine.* In a footnote, it stated that *Rosa Luciæ* (but inferentially *R. wichuraiana*), "must have been introduced into England at an earlier period, for there is a good specimen of it in the Kew Herbarium, received from Canon Ellacombe in 1880." The specimen in question is neither *R. Luciæ* nor *R. wichuraiana*, but *R. multiflora*, though it bore the first name in gardens until the error was discovered.

West Indian Frog at Kew.—The following account is reprinted from *Nature*, for October 31 (p. 643) :—

A short time ago' Mr. W. Watson, the Assistant Curator of Kew Gardens, informed me that he had noticed for several years, in some of the hot-houses, specimens of a small frog, which, hiding away during the day among the pots and orchid-baskets, enlivened the quiet evenings with their shrill whistling notes. Suspecting that this frog must be a foreign importation, I asked the Director to allow some of the specimens to be caught, and some days ago I had the pleasure of receiving three specimens in excellent condition.

The frog is *Hylodes martinicensis*, a small arboreal species, distributed over and common in many West Indian Islands (Martinique, Porto Rico, St. Vincent, Dominica, Barbados, &c., and possibly in Trinidad). Mr. Watson recollects that he observed it first some ten years ago, that he lost sight of it for some time, but that it reappeared about four or five years ago. Taking into consideration the few facts with which we are acquainted as to the reproduction of this frog, it seems most probable that several specimens of both sexes were, on more than one occasion accidentally introduced in Wardian cases.

However that may be, it is evident that the frogs have freely propagated since their introduction. At present they are most numerous in the propagating houses, in which the temperature ranges between 80 degrees and 100 degrees, sinking in winter at times to nearly 60 degrees. Accompanying Mr. Watson one evening I heard from several points the call of the frogs, which somewhat resembled the piping of a nestling bird ; and, guided by the sound, I had soon the pleasure of seeing one of them clinging to the side of a glass case.

There is nothing extraordinary in the accidental importation of individuals of a tropical species of frog into Europe, but it is an interesting experience that the species should have permanently established itself. This is owing, in the first place, to the favourable conditions under which it found itself placed, and secondly, to the peculiar mode of its propagation.

Hylodes martinicensis, and probably the majority of its congeners, does not spawn in water, but deposits from 15 to 30 ova on leaves in damp places. After a fortnight the young frogs are hatched in a perfect form, having passed through the metamorphosis within the egg, thus escaping the vicissitudes and dangers to which they would have been exposed during the progress of the usual Batrachian metamorphosis.

This instance of the acclimatisation in Kew Gardens of the 'Coqui' (as the frog is called in Porto Rico) is unique in Batrachian life at present. I trust that the little guest may long flourish where it has found such a congenial home, and where it usefully aids in the destruction of plant-eating insects and wood-lice, of which I found great numbers in the stomach of a specimen. If at a later period a nest with ova were discovered, Mr. Thiselton-Dyer would delight the heart of embryologists, to whom the opportunity of examining fresh ova of this frog would be most welcome.

ALBERT GÜNTHER.

Kew, October 20.

"Spot" disease of Orchids.—This well-known disease has been investigated by a member of the staff, and the results published in the *Annals of Botany*, (vol. ix., 1895, p. 421). When a section through a "spot" is examined under the microscope, spherical bodies are seen in many of the cells; these bodies increase in size and change their shape when in contact with water, thus resembling to some extent the parasite *Plasmodiophora*, but are in reality masses of disorganised cell contents produced by a sudden chill, caused by the presence of minute drops of water on the surface of the leaf at a time when the temperature is below the normal. "Spot" can be produced at will by placing minute particles of ice, or some drops of water on the leaf of an orchid exposed to a temperature of 10–15 degrees F. lower than usual.

The disease of vine leaves known as *Brunissure* or browning, which has been described as due to the presence of a parasite, *Plasmodiophora vitis*, is also shown to be the result of a sudden fall of temperature when the leaves are wet with rain or mist.

The following summary, while indicating the cause, suggests the means for the prevention of "spot" in cultivated orchids. (1) too high a temperature; (2) too much water, and not sufficient air in contact with the roots; (3) watering or spraying with a falling instead of a rising temperature.

Arabian objects for Museum.—Through the liberality of Mr. J. Theodore Bent the Museum of the Royal Gardens has lately become possessed of the following interesting objects from Hadramaut and Oman:—

1. A coffee pot as used at Oman, made of tin and brass and ornamented with a rough kind of chasing. 2. A pipe cut out of a solid piece of stone, and used in Hadramaut for smoking tobacco; it is about 5 inches long and bears evidence of having been in considerable use as it is quite blackened by burning tobacco. 3. A hat, such as is worn by Bedouin women, made of palm leaves, apparently those of the Date palm (*Phœnix dactylifera.*) 4. Two Incense Burners, one from Hadramaut the other from Oman. Each measures about 4 inches high and 2 inches square at the top. That from Hadramaut has a projecting handle on one side by which to carry it. It is made of coarse red earthenware with impressed ornamentation and has apparently been in considerable use, while that from Oman is quite new, with painted ornamentation covered with a glaze and without handle.

The interest attaching to these burners lies in the fact that they are probably used for burning Gum Olibanum or Frankincense, which is a product of Southern Arabia.

Pictures of the Lake.—The lake at the southern end of the Royal Gardens is an entirely artificial creation. It was commenced about 40 years ago by the late Sir William Hooker, the then Director, who had nothing more than an old gravel pit to work upon. It was further developed by Sir Joseph Hooker, and no pains have since been spared to improve its scenic beauty. The Pinetum skirts it on its east side, and the collections of alders and willows fringe it on the north and west.

These, apart from their botanical interest, have been, as far as possible, arranged to produce a pictorial effect. This has attracted the attention of M. and Mme. de l'Aubinière who, for the last two years, have been employed in painting a series of studies and pictures from different points of view. As an inspection of a selection of these would be of interest to many visitors to the Royal Gardens, the private room in the North Gallery has been utilised for the purpose.

Select Extratropical Plants readily eligible for Industrial Culture or Naturalisation.—A ninth edition of this useful work by Sir Ferdinand von Mueller, Government Botanist at Melbourne, has recently issued from the office of the Government Printer at Melbourne. This fact alone is a sufficient guarantee of the value of the book in the eyes of the public. As the title indicates, extratropical plants are dealt with; and the book may best be described as a repository of information on economic plants of all kinds, gleaned from a variety of sources. Naturally the paragraphs are of very unequal length, and some are merely suggestive. As Sir Ferdinand himself states, he has had to rely largely on the authorities from which he has drawn, and whose names he usually gives in brackets. The compiler gives the native countries of the plants; the conditions under which they grow, naturally, or are cultivated; their products or uses; their native names, and other particulars of interest or utility. Lists are also given of plants suitable for certain climates and situations. The plan of the book is alphabetical, and there is an index to vernacular names.

Cape Herbarium.—The following account of the origin and history of the Cape Herbarium is reprinted from the *Cape Times* of October 16:—

The Cape Government Herbarium has its home in the upper portion of the offices of the Agricultural Department, Grave Street, and is under the charge of Professor MacOwan, the Government Botanist. The collection was originally the private selection made by Carl Zeyher for himself, from the vast quantity of specimens of Cape exsiccata, which he, at first in conjunction with Ecklon, and afterwards alone, collected and prepared for sale to European museums during a period of about 30 years. Zeyher finally visited Europe with a large quantity of scientific material, which he was anxious to place and realise. To raise funds for the voyage, he pledged his herbarium to Dr. Ludwig Pappe, who was an enthusiastic botanist and his friend. On Zeyher's arrival in Hamburg the whole of the saleable specimens were stored in a warehouse uninsured, and by the irony of Fate were burned to ashes with the building they contained. Zeyher was helped back to the Cape by an advance from Dr. W. Sonder, and returned almost penniless. He was never able to repay either of the advances, and by a mutual understanding Pappe satisfied Dr. Sonder's claim, and increased by that amount the hypothecation on the herbarium. Ultimately Zeyher made over the collection to Dr. Pappe, who continued to study and use it daily, by the holder's hearty permission, just as if it had been still his own.

Dr. Pappe died in 1862, leaving his family in somewhat straitened circumstances and possessors of the considerable botanical library and herbaria accumulated during a long life. Unaware of the mode of exploiting either one or the other the heritors offered the library for sale at an ordinary auction, and the volumes were, with much grudging, bought by the Public Library Management at a shilling apiece. No buyer presented himself for the herbarium. At last Mr. Rawson W. Rawson, the Colonial Secretary, induced the Government to give the family 400*l*. for it. Its value then, before it had deteriorated by bad housing and years of neglect, might have been about 1,200*l*. It was stored away, now in one place and now in another, much as oathay is stored, and suffered from the inevitable insects which prey on dried plants and also from rain dripping through the roof of its presumed shelter. Then it was at Dr. J. C. Brown's suggestion, housed in a room over the Grey Library, and was at least dry. Dr. Harvey was apprised of the Government acquisition, and in 1864 offered to use it in the preparation of his *Flora Capensis*, and select and mount from it a study series of autographically certified types. This he did to the end of Volume III., when the work was cut short by his premature death. Subsequently the collection was returned to the Cape, and this study set was lodged in seven cabinets of the Kew pattern, under direction of Mr. Brown.

As nothing was being done for the collection, not even sublimating the typical study-set to prevent insect raids, Professor MacOwan, who was then living in Graham's Town, addressed Sir Philip Wodehouse on the subject in 1867, pointing out that nothing had been done for its preservation. The collection was no longer in charge of Dr. Brown, whose office of Colonial Botanist had been abolished, and it appeared to be nobody's business to do anything for it, as Mr. Trimen of the South African Museum refused to take it in charge. Professor MacOwan offered to house it at his own expense under control of the Albany Museum, and to supply the needful cabinets at his own charges. The reply was that it was not desirable to transfer the collection to the Eastern Provinces. East and West differences were then very pronounced. The collection was therefore placed in charge of Mr. James McGibbon, the gardener, but when Sir Henry Barkly succeeded Sir Philip Wodehouse, Mr. MacOwan, knowing him to be a well-informed amateur botanist, renewed his application. Sir Henry Barkly, without giving any notice to the custodian, asked to see the collection, and when displayed it was found that insect industry had destroyed scores of Harvey's valuable types. He took care, however, that the custodian should immediately treat the whole study-set in the proper manner with sublimate, so as to stop any further mischief, and generally kept things up to the mark by occasional inspections.

In February 1881, Mr. MacOwan was appointed curator, in addition to the duty of director of the Botanic Gardens. Nine new cabinets were at once added and filled, and these were increased subsequently by seven. The new curator added his private herbarium of European plants, numbering some 5000 sheets. Until the removal of the collection to the new Agricultural Offices in Grave Street, the herbarium housing arrangements were very inadequate and inconvenient. There is not much to complain of now, though the Government Botanist, in his anxiety for his charge and his scientific enthusiasm, could doubtless point out some shortcomings. It is not very accessible, indeed at the top of the building, and there is always a dread of the recurrence of the catastrophe which overtook Zeyher's collection in Hamburg. Some day, perhaps, it may be removed to a new and truly public museum, into which students will be encouraged and tempted to enter by the very aspect of the building itself.

Camphor.—The increased demand for this substance, which is obtained by distillation from the wood of *Cinnamomum Camphora*, a tree of Japan and China, has led to inquiries being addressed to Kew as to its extended cultivation in the Colonies. It grows freely in Southern Europe and is suitable for planting in any warm temperate climate.

The following note is extracted from the *British North Borneo Herald*, for September 16:—

"Nearly 20 years ago Formosa camphor was quoted at $20 per picul, but from various causes, chiefly owing to the invention of smokeless gunpowder, in the manufacture of which it is largely used, the price has now risen to $79. In this connection it is a curious fact to note that camphor which discharges a large volume of carbon during combustion should produce a smokeless compound."

The cause assigned for the rise of price proves to be erroneous, as will be seen from the following note for which Kew is indebted to Sir Frederick Abel.

SIR FREDERICK ABEL TO ROYAL GARDENS, KEW.

Imperial Institute, Imperial Institute Road,
London, S.W.,
November 16, 1895.

DEAR MR. THISELTON-DYER,

ANY increase of demand, involving a rise in the price of camphor is not due to its application as a constituent of smokeless powder. That material *was* used in the earliest days of the manufacture of a successful smokeless powder for artillery and small arms; but its employment was soon demonstrated to be attended with serious practical disadvantages, and its application for this purpose can therefore not be said to have been other than experimental, and of no great importance, even at that time, as affecting the market value of camphor.

This substance has, however, been used extensively for many years past, and no doubt in continually increasing quantities, for the conversion of collodion cotton into the material known as *Celluloid*, which is applied to the manufacture of imitation ivory, tortoise-shell, horn, and a great variety of purposes.

Yours sincerely,
(Signed) F. A. ABEL.

W. T. Thiselton-Dyer, Esq.,
C.M.G., C.I.E., F.R.S.,
Royal Gardens, Kew.

Shade Tree for Coffee.—A tree that is highly esteemed as a shade for coffee in the Republic of Colombia is described in the following extract from an interesting letter addressed to Kew by Mr. R. B. White, dated Palmira, August 6th, 1895. The tree has been identified as *Pithecolobium polycephalum*, Benth., *Hooker's London Journal of Botany*, iii. (1844), p. 219. It extends to tropical Brazil, and was collected near Rio Janeiro by Miers. Mr. White writes :—

"I enclose some seeds of a tree which is being used most successfully here as a shade for coffee. It has flowers in small white balls just the size of those of the Sensitive plant, pods long, flat, compressed, with 15 to 20 seeds. Pods do not open, being held together by strong marginal veins; they simply break up when rotten. No one here knows the name of this tree. I have referred it to Mr. Lehmann, and he does not know it. It is a native only of Antioquia, and grows in a mean temperature of 75° Fahr. It is fond of stony poor soil. A tree 18 months old will cover 144 square yards of ground (12 × 12). It goes to sleep at night, allowing the dew and cool air to reach the coffee. When young the wood is soft, but on ageing it gradually gets a red heart, and becomes hard and durable. The seed I send has been bathed in sulphate of copper solution, and I believe it to be good, so you can try a few seeds in Kew by way of curiosity and send the rest to one of our tropical establishments to be reported on. When full-grown this tree may be 50 feet high with a spread of at least 50 feet on all sides. Nothing can be better as a shade tree. It is a poor liver and does not exhaust the soil. It spreads out horizontally; it gives a good shade, not too dense, and during the night allows the dew to refresh the plants beneath. The leaflets do not litter the plantation and are too small to harbour fungi and moulds. It is easily trimmed and brought to shape. The umbrella ants will attack it but they can only get hold of one little sub-pinna at a time. They cannot get a good bite and cut out a real imposing umbrella and so they do not care to draw much on this tree when once they have balanced up working expenses and output. This is an advantage."

Crop of Cider Apples.—A correspondent in Gloucestershire writes :—

Cider apples are so abundant here that they fetch only 1*s*. a sack. Eight sacks make 100 gallons of cider, therefore 1*s*. will produce about 12 gallons of cider, or 1*d*. a gallon. Double this for making, casks, profit, &c., and you arrive at ½*d*. per quart. There is a lot of drinking in store for those who require it. About 1½*d*. will make a man drunk if three quarts of acrid liquor will do the job.

ROYAL GARDENS, KEW.

BULLETIN
OF
MISCELLANEOUS INFORMATION.

No. 108.] DECEMBER. [1895.

CCCCXCI.—CULTIVATION OF VEGETABLES.

In the *Kew Bulletin* for July 1894 (pp. 219–223) an article was reprinted from the *Standard* on the importation of vegetables. This newspaper is ordinarily well-informed on agricultural subjects, and the article appeared to give a fair summary of facts which certainly deserved careful study. Kew is not occupied with vegetable growing, and the article was reprinted only with the object of drawing attention to the subject as an economic problem.

Two of the leading horticultural journals commented upon it. The *Gardeners' Magazine* for July 21st, 1894, wrote as follows:—

MARKET SUPPLIES OF VEGETABLES.

In the current issue of the *Kew Bulletin* is given a reprint of an article from one of the dailies on the market supplies of vegetables, and as it now appears with the official sanction of a great Government department, "as a useful and, doubtless, correct summary of the facts," we feel compelled to take some notice of it. The writer states in his opening remarks that we receive large quantities of vegetables from various parts of the Continent, and that produce of excellent quality is to be met with on the costers' stalls both in London and the provincial towns, and to these statements no exception can well be taken. We are also in agreement with the writer when he tell us that the prices of tomatoes and cauliflowers have fallen considerably during the past 12 years, as indeed we are upon some other points. But there is much to which exception must be taken. We are informed, for instance, that, "In September come to hand the excellent Belgian kidneys, in many respects the very best in the market," and that, "as to the winter importation proper, tons upon tons become the property of English buyers, to whom they are consigned from the port of Hamburg." If the Belgian kidney is the "very best" potato in the market during September, it is a matter for some surprise that it has no longer a place in the market reports of that month. Further, what is said with reference to "tons upon tons" of potatoes sent from Germany, and to the German redskin holding "a high place in the market, and even continues to do so until late into April," might have held good from 10 to 20 years ago; but of late years the importation of German potatoes has greatly declined, as proved by the fact that in December 1893 we received 49 tons, and in the corresponding month of 1891 six tons only were imported from that country. "With regard to onions," we are assured that "England appears to be wholly dependent upon the stupendous foreign importations." If this be so, it would be interesting to know what becomes of the large quantities produced in Bedfordshire and some other of the counties. As we have frequently stated, we do not grow this esculent so largely as we should do, but this is a very different matter from depending "wholly" upon foreign supplies. With reference to cabbages, the writer states, "that the poor would be badly off indeed for this healthy vegetable if they relied only on the English growth," and "that the cabbages sold at the Borough Market, at Spitalfields, and along the wharves are in almost all cases imported from Holland." To confute these statements is wholly unnecessary. Nor, indeed, is it possible to seriously discuss such assertions as "the best vegetables of all grades are of foreign importation," the "English production is but a small item in the market," and "the greengrocers' stock is ten times as heavy as it was 20 years ago, yet for almost everything that is in it, the dealer he purchases from, looks to the Continent for his supply," in view of the fact that last year we devoted 1,652,860 acres to the cultivation of fruits and vegetables, of which the greater proportion was sent to market. But we must confess to some surprise that they should have been considered deserving of "permanent preservation."

The *Gardeners' Chronicle* for August 11th, 1894, contained the following paragraph:—

"In this article one side of the question is treated, but the writer has not availed himself of the very striking facts which were published on this subject in our columns last year, nor does he deal with the very difficult problems connected with markets and the means of distribution."

The general tendency of the professional journals, it will be seen, is to minimize the state of things to which attention was called. This is of course one way of dealing with it. Perhaps a more profitable one is to extract from the *Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions*, the statistical facts as to the actual importation of vegetables into this country and their value. The classification, unfortunately, is not carried into very great detail, but it brings out some striking points.

Principal Articles (Vegetables) of Foreign and Colonial Merchandise imported in 1894.

Onions, Raw:	Bushels.	£
From Germany	227,175	31,758
" Holland	1,088,610	137,799
" Belgium	266,099	32,898
" France	697,620	90,162
" Portugal	283,671	53,601
" Spain	1,189,528	196,210
" Turkey	54,701	11,476
" Egypt	1,400,793	197,751
" United States of America	17,767	3,791
" other foreign countries	7,883	1,715
Total from foreign countries	5,233,847	757,161
From Malta	51,239	7,393
" other British possessions	3,426	486
Total from British possessions	54,665	7,879
Total	5,288,512	765,040

POTATOES :	Cwts.	£
From Germany	92,427	22,623
,, Holland	271,141	71,560
,, Belgium	95,336	17,535
,, France	895,983	283,454
,, Portugal	97,521	35,133
,, Spain	14,934	5,123
,, Canary Islands	58,742	37,668
,, other foreign countries	14,398	4,369
Total from foreign countries	1,540,482	477,465
From Channel Islands	1,139,542	540,539
,, Malta	23,436	12,003
,, other British possessions	343	84
Total from British possessions	1,163,321	552,626
Total	2,703,803	1,030,091

VEGETABLES, RAW, Unenumerated, imported during the Years 1889–94.

Year.	Value.
	£
1889	621,760
1890	773,590
1891	932,917
1892	1,016,280
1893	1,076,749
1894	1,090,370

The progressive increase in the case of unenumerated vegetables from 1889 to last year speaks for itself. The following table gives the source of origin for 1894 :—

	Value.
	£
From Denmark	3,242
,, Germany	37,711
,, Holland	99,596
,, Belgium	15,644
,, France	345,530
,, Portugal	16,723
,, Madeira	5,312
,, Spain	81,324
,, Canary Islands	122,795
,, Italy	38,322
,, Austrian Territories	18,859
,, Roumania	10,062
,, United States of America	45,068
,, other foreign countries	4,137
Total from foreign countries	814,325
From Channel Islands	244,369
,, other British possessions	1,676
Total from British possessions	246,045
Total	1,090,370

TOTAL VALUE of the Vegetables imported into the United Kingdom during the Year 1894:—

	£
Onions	765,040
Potatoes	1,030,091
Raw vegetables, unenumerated	1,090,370
Total	2,885,501

The values of the imports of fruit for the same year are also striking. The following are the principal items :—

	£
APPLES (raw)	1,389,421
The most important sources of supply were :—	
United States of America	438,114
Canada	317,154
PEARS (raw)	411,316
The most important source of supply was France	191,200
PLUMS (raw)	302,105
The most important source of supply was France	170,826

Comment upon these figures may for the moment be deferred. But the whole subject has recently engaged the attention of the Board of Agriculture which published in its *Journal* for March 1895 (pp. 287–291) a very important article which is reproduced.

MARKET GARDENING.

In 1875 there were 38,957 acres of market gardens in Great Britain, whilst in 1894 there were no fewer than 88,210 acres, exclusive of vegetable crops on farms. The farmers have of late years competed keenly with market gardeners in the cultivation of greens and cabbages, with which they can feed their stock in case of a glut in the market.

Farmers, especially those near railways in direct communication with good markets, also grow, to a considerable extent, peas for podding, broad beans, turnips and turnip-greens, and early potatoes. They have not yet cultivated, at least in any important degree, those vegetables which require a great deal of labour, such as onions, carrots, parsnips, cucumbers, French beans, radishes, &c.; with respect to these, however, the market gardeners are more or less severely interfered with by foreign supplies, which grow larger year by year.

Foreign competition has made itself felt in respect of early vegetables and salads, which are imported some weeks before those grown in England are ready for market. Early turnips, carrots, peas, and French beans from France, the Canary Islands, Madeira, and Algeria, arrive long before English market-gardeners can supply these vegetables, and when their own expensive crops are ready, the fancy prices have passed into foreigners' pockets, and as market-gardeners say, " the edge of the appetite for this early produce has been taken off." The same applies to salads, notably to lettuces, which are imported in large quantities from France and the Canary Islands as early as January, months before English market-gardeners can send them into market. This importation continues until June, when the demand for young crisp lettuces has been satisfied. A few years ago cucumbers yielded considerable profits to home-growers, but now they are imported so early and so largely from Holland, and are usually so plentiful and cheap, that many market-gardeners in Great Britain have ceased to grow them. Radishes, another very profitable crop in past years, are sent in quantities from February to April from Paris, St. Malo, and the Channel Islands, completely forestalling English produce. Very large importations are made from Holland of beetroot and red cabbage for pickling, which, until recently, were profitably cultivated in England.

But it is in the case of onions that there has latterly been the most extraordinary increase in importation. Onions were regarded as an almost safe-paying crop if the weather were favourable, but in the last two years prices have been so forced down by foreign competition, that in many years, especially in 1894, the growers have lost heavily. In some instances it was impossible to dispose of onions in the last season.

In 1875, 1,695,456 bushels of onions, valued at 321,316*l.*, were imported into Great Britain, mainly from Holland, Belgium, France, and Portugal—Holland being by far the largest exporting country. The amount of this importation in 1884 was 3,474,746 bushels, valued at 481,427*l.*, from Germany, Holland (which sent 1,481,543 bushels), Belgium, France, Portugal, Spain, Italy, and Egypt. In 1894 no less than 5,288,512 bushels of onions, of the value of 765,040*l.*, came from abroad.

It is noteworthy that the imports of onions from Holland have considerably decreased since 1885, but those from Germany, France, and Spain have much increased. The receipts of onions from Egypt have more than quadrupled in the past decade.

Potatoes, again, were formerly important sources of profit to British market-gardeners. Early and quick-growing varieties were put in and dug early to supply the demand for new potatoes, and other crops were got in and taken off during the autumn. Importations of very early potatoes from Algeria, France, Lisbon, Malta, Teneriffe, and Holland interfere much with English growers of potatoes, and threaten to interfere with potato-growers in the Channel Islands, whose potatoes are not ready in any quantity until the first week in May. The arrivals of new potatoes commence about Christmas time, and continue in increasing quantities until the Channel Islands season begins. The average importation of potatoes for the first six months of the last three years from France, Lisbon, Canary Islands, Malta, the Channel Islands, and other countries was 1,764,258 cwts., of an average value of 710,586*l.*

The importation of potatoes from the Channel Islands begins in May and continues until August. The average quantity of potatoes imported from this source for the four months—May, June, July, August—of the last three years was 1,171,216 cwts., of an average value of 521,141*l.* for each of the three periods.

The average annual importation of potatoes of the last three years from all parts of the world to this country amounted to 2,846,754 cwts., of an average value of 962,458*l.*

The volume of imported potatoes has, however, decreased considerably during the past quarter of a century, and the character of the trade has changed in a great and significant degree. For the three years ending 1875, the average annual importation of potatoes was 5,363,136 cwts. For the three years ending 1885, the annual average importation was 3,297,867 cwt. Since 1880, some of the large importing countries which formerly sent potatoes in the late summer and autumn have greatly diminished their supplies, as they could not compete with the English main crop produce. But from the Canary Islands, the Azores, Malta, Spain, and the south of France, and other sources, steady supplies of new potatoes have been sent.

Besides the new potatoes and onions imported, large quantities of raw, unenumerated vegetables, such as peas, French beans, lettuce, and other "salads," cauliflowers, spinach, beetroot, radishes, turnips, and cucumbers are sent from Denmark, Germany, Holland, France, Portugal, Madeira, Spain, Canary Isles, Italy, Austrian Territories, Roumania, United States, and other countries. The average annual value of these imported vegetables during the past three years was 1,027,411*l.* In 1885 the value of these raw vegetables was 467,287*l.*, while in 1875 it was only 132,124*l*, divided mainly between Holland, France, and Germany.

This importation of raw vegetables is spread fairly evenly over each month in the year, though it is somewhat larger in June, July, and August. It interferes materially with the prices of *primeurs* in the early spring months, and it is from *primeurs* and delicate vegetables and salads that market-gardeners have hitherto made their chief gains. Some profit is still made from young "bunching" onions in May and June, as onions are not imported in this form. These are now, however, produced by farmers who, as a market-gardener remarked lately, 'are driven into it, and look over the hedge, and try to imitate their neighbours.' Until a few years ago, celery was a very paying crop, realising gross returns of 40*l.* to 70*l.* per acre, when it was grown by comparatively few *bonâ fide* market-gardeners. Now it is grown by farmers, and upon sewage farms, so that prices have fallen, and in some seasons the markets are over-supplied. Large quantities of celery are now grown in Yorkshire and Lincolnshire. In some districts, asparagus was formerly produced with considerable profit to the growers, especially for the first fortnight or so of the season, but the importation of asparagus from Toulouse, Dijon, Paris, and parts of Spain, which begins in January and continues until about the time when English asparagus is ready, has in recent years rendered this crop less profitable.

The high rents of market-garden land near London, in Middlesex, Essex, Kent, and Surrey, as well as the dearness and scarcity of labour, also handicap the industry. This applies to all market-gardens near large centres of population where the labourers can get good wages in various other employments. Near London and other cities, women, whose labour is most useful in some of the processes of cultivation and after-management of vegetables, are becoming more and more disinclined to work on the land. In the production of such crops as onions, carrots, celery, and lettuce, a great deal of labour is absolutely essential, not only for their cultivation, but also for preparing them for market, and in this respect farmers in many localities would have a considerable advantage. Market-gardeners in the vicinity of London and other populous places are able to cart their vegetables to market in their own conveyances. Farmers who live near railways communicating directly with markets, are able to consign large quantities of vegetables at fairly reasonable rates, though they and market-gardeners complain of the rates charged for small consignments of their produce.

Technical knowledge is necessary in the production of vegetables. Some market-gardeners are particularly clever, energetic, and hardworking, always on the look-out for some new "idea," and many of them, from their connexion with salesmen and their propinquity to towns are in close touch with the vegetable markets, and are well and regularly posted up as to supply and demand. In these respects they have a certain advantage over farmers, who do not, as a rule, care about small details, and would not have such opportunities of getting information as to immediate and prospective market wants. But where technical knowledge may be easily obtained, as well as reliable and continuous information concerning the state of markets, and it will pay to grow vegetables, farmers will no doubt adapt themselves to circumstances rendered necessary by the exigencies of the times.

There appears to be some opening for the further cultivation of tomatoes under glass. It would seem to be generally admitted that the climate of this country is too uncertain to permit of their successful cultivation in the open. A large and increasing business is carried on in the Channel Islands in growing tomatoes, in cheaply-built glass-houses, for the English markets. The cultivation of this vegetable is simple and profitable, and in view of the increasing demand, it may be worthy of the attention of British farmers.

Market-gardeners have done best who grow fruit and vegetables together, in localities distant from London, and near railways communicating readily with Manchester and Birmingham as well as the metropolis. Flowers and tomatoes are also grown occasionally, as well as herbs and salads, so that there is almost always something to send to market. In some of these favoured districts, as Pershore and Evesham, for example, there has been a large increase in the acreage of market-garden land, and the demand for, and the price of suitable land have increased. But even here there has been a marked falling-off in the profits in the past two years, and the cultivators are somewhat discouraged, and are re-arranging their rotations to suit the altered conditions.

It was pointed out in the *Kew Bulletin* (1894, p. 219) that there are two problems involved in the question. Early vegetables and those which require abundance of summer sunshine to mature them may be grown in warm climates in the open air, but can in this country only be produced under glass. "Early vegetables are a luxury for the rich. They can always be produced in lower latitudes for consumption in higher. The enhanced cost principally represents the difficulty and distance of transport for perishable commodities." The competition is between the cost of transit on the one hand and the interest on the capital invested on the other, supposing that in other respects the cost of production to be about equal. But the cost of foreign transport is continually being reduced, and in the long run the foreign article is likely to oust the home-grown.

Where, however, the competition is with contiguous countries in the North of Europe, the explanation of the large and increasing amount of foreign imports is not so obvious. It is noteworthy that according to the Board of Agriculture, "the importation of raw vegetables is spread fairly evenly over each month of the year, though it is somewhat larger in June, July, and August." Here it is not wholly a question of earliness. It is interesting to analyse the causes assigned by the Board of Agriculture :—

i. High rents.
ii. Disinclination of women to work on the land.
iii. Excessive railway rates for small consignments.
iv. Want of technical knowledge.

It is clear that with regard to i., iii., and iv., they are susceptible of self-adjustment. Rents may come down ; technical knowledge will increase ; and already railway companies are showing a disposition to facilitate the distribution to the consumer of vegetable produce. ii. points to another and less obvious cause, which at first sight seems paradoxical—the increasing prosperity of the country and the rise in the "standard of comfort." To put the point in an extreme form: a nation might say that it would rather buy an article of consumption from outside than produce it itself; and it is by no means impossible that this approaches the secret of the whole matter. If the price of labour allows of cabbages being grown more cheaply in Holland than in England, they will be imported.

The Board of Agriculture pointed out in its Journal for December 1894 (b. 150) another cause:—

v. The fewness of distributing centres.

"So long as the practice continues of consigning the chief part of the fruit grown in this country to the few existing markets there must be occasional glut." Yet, however abundant the harvest of fruit, the price to the local consumer rarely falls. What is mainly wanted then is greater facilities of distribution as between the producer and the consumer.

The following interesting illustration is taken from the *Daily Telegraph* for July 17, 1894:—

"A correspondent says: A salesman in Covent Garden had consigned to him last Saturday 2,500 bags of peas, representing 30,000 pecks. A large quantity of these were sold as low as 1*s*. per bag, or 1*d*. per peck. The cost of gathering is about 1*s*., carriage 6*d*., commission and other charges 6*d*., total 2*s*. each bag. The coster would gain a heap of money by the glut, the public an advantage, the salesman his commission, and lastly the producer, whose share has wholly disappeared, may find himself called upon to make good any loss incurred by the transaction."

With regard to potatoes it is interesting to observe that the importation is gradually declining. According to the *Agricultural Returns for Great Britain*, 1894, published by the Board of Agriculture (p. xxxix.), the figures for the last twenty years stand as follows:—

	Tons.
1873	375,300
1883	257,500
1893	141,000

For the last year the gross production in the United Kingdom was 6,541,000 tons (p. xxvi.). One potato therefore in something under fifty would be foreign. But as the bulk of the imports of potatoes are from France and the Channel Islands, it is obvious it is pretty nearly accounted for by the earlier crop which those countries produce.

The case of onions is, however, the most enigmatical. The *Gardeners' Magazine* asks, "What becomes of the large crops grown in Bedfordshire?" and the Board of Agriculture replies, "in some instances, it was impossible to dispose of onions in the last season."

The pages of the *Gardeners' Chronicle*, which is the leading professional journal, have been searched for "striking facts" which would throw light on the problems involved, without much success.

In the number of February 4, 1893 (page 136) it states that "much of the success attending the importation of American apples is due to colour in the fruit." It recommends "making a better selection of varieties of apples as well as improved methods of culture and of packing" and further that in schools "children should be taught that it is a patriotic thing to consume a home grown apple."

The same number gives (page 137) a striking statement as to the contrast between home and foreign freights.

"As an illustration of the excessive charges which agriculture in this country has to submit to, it may be mentioned that it costs less to bring agricultural seeds from Chicago to London, a distance of about 4,000 miles (of which 1,000 are by rail and 3,000 by steamer) than it does from stations within 150 miles of London. In Europe also, the difference though less is still excessive, the carriage from the North of France to London being less than from the home counties, and from the South of France than from Yorkshire."

CCCCXCII.—DECADES KEWENSES.

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECAS XXII.

The plants of this decade are from a collection made by Dr. Leo Hirsch, in the summer of 1893, in the country of Hadramaut, in Southern Arabia. They were placed at our disposal for publication by Dr. Schweinfurth, with the special idea of their being compared with the collections made in the same region by J. Theodore Bent, Esq., and Mr. Lunt, which are reported upon in the *Bulletin* for 1894, pp. 328–343, and 1895, p. 158 and pp. 180–186. Dr. Hirsch landed at Makalla, ascended the mountains of the interior to a height of over 6000 feet, and returned to the same port. A short account of his expedition will be found in Petermann's *Mittheilungen*, 1894, p. 30. The collection contained about 150 species, of which only three were amongst the novelties discovered by Messrs. Bent and Lunt.

211. **Dombeya arabica**, *Baker* [Sterculiaceæ]; fruticosa, ramulis dense stellato-pubescentibus, foliis breviter peliolatis cordato-orbicularibus obtusis sinuatis irregulariter dentatis prope marginem crispatis facie tenuiter dorso dense stellato-pubescentibus venis elevatis, cymis pluribus in paniculam brevem coarctatis ramis dense pubescentibus, bracteis ovatis pilosis, pedicellis flore longioribus, sepalis ovatis dense pubescentibus, petalis obovatis coccineis calyce paulo longioribus, staminibus 15 tubo filamentarum brevissimo staminodiis lanceolatis petaloideis coccineis, stylo obsoleto.

Habitat.—Hadramaut, Southern Arabia, *Hirsch*, 170.

Folia 3–4 poll. longa et lata. *Calyx* 3 lin. longus. *Petala* 4 lin. longa.

Very distinct in its very short staminal tube, staminodia just like the petals in colour and texture, and obsolete style.

212. **Thamnosma Hirschii**, *Schwf.* [Rutaceæ]; herbacea, perennis, glabra, in partibus omnibus glandulis subimmersis copiosis rutaceis flavo-viridibus prædita, foliis remotis sessilibus linearibus marginibus revolutis, floribus laxe racemosis, pedicellis erecto-patentibus, calycis lobis ovatis obtusis, petalis oblongis calyce 3–4-plo longioribus, stami-

nibus petalis æquilongis filamentis linearibus antheris parvis globosis, fructu coriaceo oblongo profunde bifido lobis apice rotundatis, seminibus globosis granulatis.

Habitat.—Kischin, Hadramaut, Southern Arabia, *Hirsch*, 77. Native name *bdalit.*

Folia 4–9 lin. longa. *Petala* 1 lin. longa. *Fructus* 3 lin. longus.

The two original species came from Texas and California. Dr. Balfour found a third in Socotra; and we have a fourth from the Transvaal, as yet undescribed, collected by Dr. Atherstone. The Arabian plant most resembles *T. texana*, Torrey.

213. **Rhamnus leucodermis**, *Baker* [Rhamnaceæ]; fruticosa, glabra, ramulis albis teretibus spinis pungentibus patulis cylindricis rectis basi dilatatis ad nodos præditis, foliis fasciculatis obovati-oblongis obtusis breviter petiolatis rigide coriaceis utrinque viridibus, floribus solitariis pedunculatis, calycis campanulati lobis ovatis, petalis angustis viridibus calyce paulo longioribus, ovario globoso, stylo ovario æquilongo, fructu globoso cuspidato.

Habitat.—Hadramaut, Southern Arabia, *Hirsch*, 84.

Folia 4–6 lin. longa. *Sepala* ½ lin. longa. *Fructus* 2 lin. longus.

Near *R. oleoides*, Linn. and *R. græca*, Boiss.

214. **Rhus flexicaulis**, *Baker* [Anacardiaceæ]; fruticosa, ramulis gracillimis teretibus dense pilosis, foliis petiolatis digitatim trifoliolatis foliolis oblanceolato-oblongis obtusis integris basi cuneatis utrinque sordide viridibus dense pilosis, floribus perminutis in paniculam amplam laxam terminalem ramis pubescentibus flexuosis dispositis, pedicellis erecto-patentibus flore longioribus, bracteis ovatis acutis parvis persistentibus, sepalis late ovatis, petalis oblongis obtusis viridibus calyce 2–3 plo longioribus, staminibus petalis brevioribus.

Habitat.—Hadramaut, Southern Arabia, *Hirsch*, 153.

Petioli 3–4 lin. longi. *Foliola* 6–8 lin. longa. *Petala* ½ lin longa. *Fructus* ignotus.

Near the Indian *R. mysorensis*, Heyne. and *R. parviflora*, Roxb.

215. **Tephrosia (Reineria) geminiflora**, *Baker* [Leguminosæ]; herbacea, perennis, caulibus gracillimis adpresse albo-sericeis, stipulis subulatis persistentibus, foliis petiolatis pinnatim trifoliolatis foliolis linearibus rigide coriaceis utrinque adpresse albo-sericeis terminali breviter petiolulato lateralibus majore, floribus geminis axillaribus, pedicellis calyce brevioribus, calycis tubo campanulato sericeo dentibus cuspidatis basi deltoideis tubo longioribus, petalis pallide rubellis calyce duplo longioribus, vexillo obovato extus sericeo, alis angustis vexillo distincte brevioribus, genitalibus petalis brevioribus, ovario lineari multiovulato.

Habitat.—Hadramaut, Southern Arabia, *Hirsch*, 94.

Foliolum terminale 12–15 lin. longum, 1 lin. latum. *Calyx* 1½ lin. longus. *Vexillum* 3 lin. longum. *Fructus* ignotus.

Near *T. subtriflora*, Hochst.

216. **Conyza stenodonta**, *Baker* [Compositæ-Asteroideæ]; suffruticosa, ramulis lignosis brunneis obscure pubescentibus, foliis crebris sessilibus oblanceolatis acutis pinnatifidis segmentis paucis remotis

linearibus margine leviter recurvatis, capitulis multis laxe corymboso-paniculatis, pedunculis brevibus vel elongatis, involucri campanulati bracteis multiseriatis rigidis pallidis adpressis, interioribus linearibus exterioribus sensim brevioribus, achæniis cylindricis, pappo albo flexili corollæ tubo æquilongo.

Habitat.—Hadramaut, Southern Arabia, *Hirsch*, 55. Native name, *hatéke.*

Folia 12–15 lin. longa, segmentis 1 lin. latis. *Involucrum* 2–2½ lin. longum. *Pappus* 1½ lin. longus.

Near *C. stricta*, Willd.

217. **Conyza cylindrica**, *Baker* [Compositæ-Asteroideæ]; suffruticosa, tenuiter albo-incana, ramulis lignosis teretibus pallidis, foliis sessilibus simplicibus crassis subcylindricis facie canaliculatis, capitulis paucis laxe corymbosis longe pedunculatis, involucri campanulati bracteis multiseriatis adpressis rigidis pallidis interioribus linearibus exterioribus sensim brevioribus, achæniis pubescentibus, pappo setoso albo flexili corollæ tubo æquilongo.

Habitat.—Ras Schirwén, Hadramaut, Southern Arabia, *Hirsch*, 80. Native name, *Tabefet.*

Folia ½–1½ poll. longa, ½ lin. diam. *Involucrum* 2 lin. longum. *Pappus* 1½ lin. longus.

218. **Grantia senecionoides**, *Baker* [Compositæ - Inuloideæ]; herbacea, perennis, caulibus pilis mollibus brevibus patalis dense vestitis, foliis alternis petiolatis lyrato-oblongis bipinnatifidis lobo centrali oblanceolato lateralibus paucis remotis superioribus pinnatifidis segmentis linearibus inferioribus sensim minoribus, capitulis multifloris discoideis ad apices ramulorum solitariis involucri campanulati bracteis biseriatis exterioribus foliaceis integris linearibus interioribus brevioribus lanceolatis scariosis pallidis pubescentibus, achæniis pubescentibus, pappo biseriale exteriore brevi paleaceo interiore setoso albido corollæ tubo æquilongo.

Habitat.—Hadramaut, Southern Arabia, *Hirsch*, 14.

Folia inferiora (cum petiolo) 3–4 poll. longa, segmentis 1 lin. latis. *Involucrum* 6 lin. longum. *Pappus* 3 lin. longus.

Resembles *G. discoidea*, Bunge, in the capitula and involucre. Differs by its bipinnatifid leaves.

219. **Hirschia**, *Baker* [Compositarum-Inuloidearum genus novum]. *Capitula* homogama, multiflora, discoidea, floribus omnibus hermaphroditis. *Involucrum* duplex, bracteis exterioribus foliaceis profunde pinnatifidis, interioribus 2–3-seriatis chartaceis lanceolatis æquilongis. *Receptaculum* convexum. *Corolla* subcylindrica, lobis 5 æqualibus erectis ovatis cuspidatis. *Antheræ* basi caudatæ. *Stylus* plane evolutus ignotus. *Pappus* setosus, setis fragilibus valde inæqualibus, exterioribus brevioribus. *Herba* perennis, ramulis albo-incanis, foliis alternis petiolatis bipinnatifidis segmentis angustis, capitulis ad apices ramorum solitariis.

H. anthemidifolia, *Baker*. The only species.

Habitat. Hadramaut, Southern Arabia, *Hirsch*, 35.

Folia cum petiolo 1–1½ poll. longa, segmentis ⅓ lin. latis. *Involucrum* 7–8 lin. longum. *Pappus* 3 lin. longus.

This new genus comes nearest to *Grantia*, from which it differs by its homogamous discoid flowers, biseriate involucre with pinnatifid foliaceous outer bracts, and the absence of a paleaceous outer row to the pappus. In general habit it most resembles the Algerine *Grantia* (*Perralderia*) *coronopifolia*, Benth. et Hook. fil.

220. **Caralluma arabica,** *N. E. Brown* [Asclepiadeæ]; *C. tuberculatæ* similis, floribus terminalibus umbellatis pedicellatis omnino glabris, sepalis ovatis acutis, corollæ tubo brevi campanulato lobis ovatis acutis levibus atro-purpureis, coronæ exterioris lobis profunde bifidis segmentis lineari-filiformibus obtusis erectis apice arcuatis quam columna staminum multo longioribus, coronæ interioris lobis linearibus obtusis dorso gibbosis super antheras incumbentibus et eis subæquantibus.

Habitat.—Southern Arabia: Wadi Raida, near Saihut, *Hirsch*, 28.

Pedicelli 1½–2 lin. longi. *Sepala* ½–⅔ lin. longa. *Corollæ tubus* 1⅓ lin. longus, lobi 2 lin. longi, 1½ lin. lati. *Coronæ exterioris* lobi ¾ lin. longi, segmentis ½ lin. longis; interioris lobi ¼–⅓ lin. longi.

CCCCXCIII.—MISCELLANEOUS NOTES.

Mr. Frederick Enos Willey, in the employ of the Royal Gardens, has been appointed by the Secretary of State for the Colonies Curator of the newly founded Botanic Station at Sierra Leone. Mr. Willey entered the Royal Gardens in June 1892. He was lent from Kew to act as Curator of the Botanic Station at Aburi, Gold Coast, during the absence, in 1893–4, of the late Mr. Crowther, who was sent by his Government to inspect the principal Botanic Gardens in the West Indies. Mr. Willey managed the station to the satisfaction of the Government of the Gold Coast and is therefore prepared by previous experience in West Africa for the duties of his new post.

Mr. J. M. Henry has retired from the post of Superintendent of the Baroda State Gardens after 16 years service. He was sent out from Kew in 1867, and after 12 years service in Madras and Bengal was appointed to Baroda in November 1879.

Botanical Magazine.—The number for November is essentially an orchid number, the only other plant figured being the showy verbenaceous *Amasonia erecta*, a native of eastern tropical South America, for living plants of which Kew is indebted to Messrs. Sander & Co. The orchids are: *Angræcum Kotschyi*, from a very fine raceme from the garden of Sir Trevor Lawrence; *Spathoglottis kimballiana*, a pretty Bornean species, also one of Messrs. Sander's introductions; *Catasetum Lemosii*, native of the Ile de Marajo, at the mouth of the Amazons, sent to Kew by Mr. E. Rand in 1894; and *Selenipedium sargentianum*, a native of Brazil, imported by Messrs. Sander, and flowered in 1895. With the exception of the *Catasetum*, these are all handsome ornamental orchids.

Hooker's Icones Plantarum.—Part one of Vol. V. of the fourth series (plates 2401–2425) opens with some new *Dipterocarpeæ*, including the handsome, though almost worthless, *Dipterocarpus Bourdilloni*, "an enormous tree 150 feet high, with a straight trunk 5 feet in diameter," inhabiting North Travancore. *Ramisia brasiliensis* is a somewhat anomalous member of the *Nyctagineæ*, clothed with stellate scales like an *Elæagnus*, and having an accrescent perianth 1½ inches in diameter, enclosing the ripe fruit. *Lysimachia grandifolia*, a native of China, is remarkable for its ample foliage and umbellate flowers; and *Petrocosmea grandiflora*, from the same country, is a beautiful species with cobalt blue flowers three times as large as those of the previously known species. *Daniella thurifera* is the frankincense tree of Sierra Leone. *Comoroa pisocarpa* is a new genus of the *Aurantiaceæ*, having unifoliolate leaves and minute flowers. *Melastomaceæ* are represented by a number of curious novelties from Borneo, including a new genus, *Hederella*, allied to *Medinilla*. *Aloe minima* is a diminutive species discovered by M. S. Evans in Natal. Finally there are figures of two elegant species of the Mexican umbelliferous genus *Neogoezia*, described in the *Bulletin*, 1894, p. 354. Unfortunately several misprints and other errors were overlooked in this number. Thus in the letterpress to plate 2415, p. 3, the name *Malanthos* and its derivation should be cancelled. *Hederella quintuplinervis*, Stapf, plate 2416, is not a new species, but the same as *Dissochæta quintuplinervis*, Cogn. *Pomatostoma sertuliferum*, plate 2420, is also not new, as may be seen from the synonymy.

Distribution of Kew Seeds.—The publication annually of a list of seeds ripened at Kew and available for exchange has resulted in a considerable increase in the number of packets of seeds distributed. They are applied for from both public and private gardens in all parts of the world. The seeds are for the most part of select plants. Last year (1894) nearly 6000 packets were supplied to correspondents whose desiderata had been selected from the printed list. In addition to this number nearly 1000 packets of seeds received from Botanic Gardens in India and the Colonies were distributed from Kew. The total number of packets of seeds distributed annually from Kew previous to the issue of a printed list in 1885 was about 2000 per annum.

Removal of large Screw Pines.—The disappearance from the north wing of the Palm house of the two large specimens of Screw Pines (*Pandanus*) which had for so many years been conspicuous objects in it requires a brief record. The age of both was probably not less than 70–80 years. They were, therefore, in existence at Kew before it became a national establishment. The names which they have always borne are perhaps not free from doubt. But the accurate determination of Pandanads is attended with extreme difficulty.

Pandanus reflexus.—This was a striking plant of great size which stood at the end of the wing near the staircase. It immediately attracted attention from its dense heads of enormous stiff sword-shaped leaves. According to John Smith's *Records of Kew* (p. 126) it was introduced to Kew by Wallich in 1818. *P. reflexus* is an obscure species said to be a native of Bourbon. Whether the Kew plant was correctly referred to it will perhaps never be known with certainty. It was a male plant and the correct determination of plants of this sex presents great difficulties.

In July 1889 a large plant of *Pandanus odoratissimus* was received from the Oxford Botanic Garden and planted in the Palm house immediately opposite the *Pandanus reflexus*. It died in the following November apparently from the same disease as eventually also killed the larger plant. In 1891 it was noticed that the foliage of this had a somewhat yellowish and unhealthy appearance. The great heads of leaves than began one by one to fall over, evidently from a rotting of the stem at the "neck." They were removed but the mischief continued and eventually it became necessary to sacrifice the whole plant.

The loss from disease of a large and important specimen in a Botanic Garden where it is constantly under observation is a comparatively rare event. In the case of Pandanads several cases however are recorded, the details of which agree in all essential particulars. In 1870 a plant of *P. odoratissimus* with a stem 10 feet high perished in this way in the Breslau Botanic Garden. It was made the subject of an elaborate investigation by Dr. J. Schroeter in Cohn's "*Beitrage zue Biologie der Pflanzen*" (i., pp. 87–107). He gave the disease the very appropriate name of "Die Stamm fäule der Pandaneen." His careful description of the progress of the disease exactly agrees with what was observed at Kew:—"The leaves were healthy except at the base where they were soft and discoloured. The part of the stem exposed by their falling, about 8 inches in length, was yellow-grey in colour; below this diseased band there were spots similarly affected. Above the band the stem appeared to be healthy. The disease extended downwards and inwards. All the branches ultimately became affected."

Curiously enough in the same year a fine screw pine (*Pandanus utilis*) at the Botanic Garden, Glasnevin, succumbed in the same way. The director, Dr. Moore, gave an account of it to the Royal Dublin Society on March 20, 1871. "It was upwards of 50 years old, and had attained to a height of 25 feet from the ground to its uppermost branches, having a clean stem for nearly 10 feet." The account which Dr. Moore gives of the progressive destruction of the Dublin plant accords exactly with our experience at Kew.

Material from the Kew plant was sent for examination to Professor Marshall Ward, F.R.S. He reported "There is no doubt whatever as to the main point. I have got into the heart of the stem, and find a perfectly distinct, though very slender, mycelium ramifying in the cell-walls; as yet I do not see it in the leaves. It is a most murderous 'beast' evidently."

Dr. Schroeter found what can hardly be doubted to have been the same fungus in the Breslau case. He identified it with *Melanconium Pandani* which Léveillè found attacking a *Pandanus* at Paris in 1845.

Melanconium is, however, only a phase in the life-history of some sphæriaceous fungus. Other phases no doubt exist in a less conspicuous form, and it is from these that the screw pines become infected. It is noticeable that in all the recorded cases the plants have attained considerable dimensions before they are attacked.

Pandanus odoratissimus.—There is no record of the original introduction of the striking plant which, under this name, occupied a conspicuous position at the extreme end of the north wing. But it was probably of about the same age as the *P. reflexus*. Unfortunately screw pines grow only from the extremities of their branches, and do not when cut in produce new growths by the development of adventitious buds. No ordinary horticultural building can therefore eventually accommodate them, and their removal on account of unmanageable size is only a question of time. Before its removal the great Kew Screw Pine "had about 40 branches, each bearing a huge tuft of foliage, and it measured 30 feet in height, with a diameter of 40 feet. Its weight would be about 6 tons."

It was a female plant and first fruited in 1883 and produced its large heads of fruits about a foot long almost every subsequent year. It was removed in 1894 and was then bearing five heads. Up to 1882 it was grown in a tub, and there is a good figure of it in that stage in the supplement to the *Gardeners' Chronicle* for August 5, 1876. In that year it was lowered into a brick pit prepared for the purpose and so gained an additional space in height of 5 feet. The base of the stem with the striking mass of aerial roots has been carefully preserved for future exhibition in No. III. Museum. An illustration of the striking mass was published in the *Gardeners' Chronicle* for January 5, 1895. *P. odoratissimus*, Roxb., is reduced in the Flora of British India to ***P. fascicularis***, Lam.

Citrus inodora.—This is a new species of *Citrus*, native of Queensland. It is of interest as possessing economic qualities rendering it suitable for cultivation as a substitute for the West India lime or for affording an Australian stock on which to graft or bud other sorts of *Citrus* plants. The following account is taken from the *Transactions of the Queensland Acclimatisation Society* (July–September, 1894, p. 194):—

Citrus inodora.—The Council were indebted to Mr. F. M. Bailey, F.L.S., Colonial Botanist, for quantity of seeds and scions of this Queensland lime. Mr. Bailey, in his *Third Supplement to the Synopsis of the Queensland Flora* (1890, page 12), describes the plant, whose habitat is on Harvey's Creek, Russell River. He adds: "This new species of Citrus is well worthy of cultivation for its fruit, which is juicy, and equal in flavour to the West Indian lime. In general appearance the tree resembles the orange, having the same dark-green foliage. I have chosen the specific name on account of all the flowers gathered being wanting in fragrance—a remarkable feature in a genus so noted for scented flowers." From the fruits sent by Mr. Bailey to the Society a large number of seeds were got; these had all been sown under favourable conditions, while the scions have been grafted upon Citrus roots. Mr. Bailey is of opinion that this Citrus plant will be an excellent stock on which to work any of the other sorts; it being a native, and, so far as is known, not liable to any disease, is greatly in its favour for stock purposes.

Sarda Melon.—A description of this melon was published in the *Kew Bulletin* for 1894, p. 75, ripe fruits having been received at Kew from Dr. Aitchison, F.R.S., C.I.E., who obtained them from Kabul. The seeds from these fruits were distributed to several Colonial Botanic Gardens, and to the principal private gardens in this country, including Her Majesty's Royal Gardens, Frogmore, Windsor, from whence a fruit was sent to Kew by Mr. O. Thomas, who wrote: "I send you a small fruit of the Sarda Melon for you to taste. The flavour, I think, sweet, and very refreshing. I shall certainly grow this melon again, and use it to cross with other varieties." The fruit was 10 in. long and 7 in. in diameter; the skin yellowish-green and netted, the wall of flesh 2 in. thick, and rich in flavour as well as sweet and juicy. Dr. Aitchison pointed out in a note published in the *Kew Bulletin* that the Sarda Melon does not develop its full flavour until it has been exposed to a low temperature, and then kept for a time.

Icerya ægyptiaca in India.—In the *Kew Bulletin* for May 1890 (pp. 94–97) Mr. J. W. Douglas gave an account of a new "Mealy Bug" or coccid from Alexandria, under the name of *Crossotosoma ægyptiacum*, which Mr. Riley, the United States entomologist, subsequently identified as an *Icerya* (*Kew Bulletin*, 1891, p. 48). What Mr. Douglas believes to be the same insect has been recently found on a plant of *Aristolochia saccata* on its arrival at Kew from the Royal Botanic Garden, Calcutta, where it would, therefore, appear to be established.

Errata.—Page 94, 9th line from bottom, *for* "longpipes" *read* "longipes."

Page 124, 24th line from top, *for* "Inconum" *read* "Iconum."

Page 193, 3rd line, *for* "Batemania" *read* "Batemannia."

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ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX I.—1895.

LIST OF SEEDS OF HARDY HERBACEOUS PLANTS AND OF TREES AND SHRUBS.

The following is a list of seeds of Hardy Herbaceous Annual and Perennial Plants and of Hardy Trees and Shrubs which, for the most part, have ripened at Kew during the year 1894. These seeds are not sold to the general public, but are available for exchange with Colonial, Indian, and Foreign Botanic Gardens, as well as with regular correspondents of Kew. No application, except from remote colonial possessions, can be entertained after the end of March.

HERBACEOUS PLANTS.

- Acæna cylindrostachya, R. & P., Chili.
  - macrostemon, Hk. fil., N. Zealand.
  - microphylla, Hk. fil., N. Zealand.
  - myriophylla, Ldl., Chili.
  - ovalifolia, Ruiz & Pavon, Peru.
  - Sanguisorbæ, Vahl, New Zeal.
  - sericea, Jacq., Mexico.
- Acanthus longifolius, Host, S. Eur.
- Achillea Ageratum, L., Europe.
  - aegyptiaca, L., Eur., etc.
  - decolorans, Schrad., Eur.
  - filipendulina, Lam., Caucasus.
  - ligustica, All., Eur.
  - Millefolium, L., Eur.
  - Ptarmica, L., Eur.
  - rupestris, H. P. R., Tyrol.
  - setacea, W. & K., Eur.
  - tomentosa, L., Eur.
  - umbellata, Sib. & Sm., Greece.
- Aconitum Fischeri, Reichb., Kamtsch.
  - heterophyllum, Wall., India.
  - Lycoctonum, L., Eur., etc.
  - — var. orientale, Hort.
  - Napellus, L., Eur., Temp. Asia.
  - — var. album.
- Acroglochin chenopodioides, Schrad., W. Himal.
- Actæa spicata, L., Northern Hemisphere.
- Actinolepis coronaria, Gray, Calif.
- Actinomeris squarrosa, Nutt., N. Amer.
- Adenophora liliifolia, Bess., Hungary, etc.
- Adesmia muricata, DC., Chili.
- Adlumia cirrhosa, Raf., Unit. States.
- Adonis æstivalis, L., Eur.
- Ægogopon pusillus, Beauv., Mexico.

n 84265. 1375.—11/94. Wt. 45. A

Æthionema Buxbaumii, DC., Thrace.
pulchellum, Boiss., Armenia.
saxatile, R.Br., S. Eur.

Agrimonia leucantha, Kunze.
odorata, Mill., Eur.

Agropyrum dasyanthum, Led., Siberia.
glaucum, R.S., Eur.
pungens, R.S., Eur.
— var. pycnanthum, Godr.
tenerum, Vasey, N. Amer.

Agrostis alba, L., Eur.
— var. gigantea, Rth.
— var. stolonifera, (L.)
nebulosa, Bss. R., Eur.
nigra, With., Eur.
vulgaris, With., Eur.

Alchemilla alpina, L., Eur.
argentea, Don, Eur.
vulgaris, L., Eur.

Aletris farinosa, L., N. Amer.

Alisma Plantago, L., Eur.

Allium Ampeloprasum., L., Eur.
angulosum, L., Siberia.
atropurpureum, W. & K., Hungary.
Babingtoni, Bor., Eur.
bauerianum, Baker, Orient.
carinatum, L., Eur.
Cydni, S. & K., Sicily.
fistulosum, L., Siberia.
flavum, L., Eur.
giganteum, Regel, Siber.
globosum, Redouté, S. E. Eur.
— var. albidum.
hymenorrhizum, Ledeb., Siberia.
— var. tenuifolium, Regl.
kansuense, Rgl., China.
karataviense, Rgl., Turkestan.
Moly, L., Eur.
montanum, F. W. Schm., Eur.
narcissiflorum, Vill., Eur.
nigrum, L., Eur.
odorum, L., Siberia.
ostrowskianum, Rgl., Asia Minor.
polyphyllum, Kar. et Kir., Siberia.
pulchellum, Don, Eur.
roseum, L., Eur.
Schœnoprasum, L., Eur.
— var. sibiricum, (L.)

Allium—*cont.*
senescens, L., Eur., Siber.
stipitatum, Rgl., Turkestan.
subhirsutum, L., Eur.
urceolatum, Rgl., Turkestan.
ursinum, L., Eur.
vernale, Tin., Eur.
Victorialis, L., Eur., Siber., etc.

Alonsoa incisifolia, R. & P., Peru.

Alopecurus agrestis, L., Eur.
geniculatus, L., Eur.
nigricans, Hornem., Eur.
pratensis, L., Eur.
— var. fol. variegatis.

Alstrœmeria aurantiaca, Don, Chili.
hæmantha, R. & P., Chili.

Althæa cannabina, L., Eur., var. narbonensis, Pourr.
ficifolia, Cav., Dalm., etc.
Heldreichii, Boiss., Macedonia.
lavateraeflora, DC., Syria.
pallida, W. & K., Eur.
rosea, Cav., Eur., Orient.
sulphurea, Boiss. & Hausskn., Persia.

Alyssum argenteum, Vitm., Eur.
gemonense, L., Eur.
incanum, L., Eur.
maritimum, Lam., Eur.
minimum, W., Eur.
montanum, L., Eur.
podolicum, Bess., Eur., etc.
pyrenaicum, Lap., Pyren.
saxatile, L., Russia.

Amaranthus chlorostachys, Willd., India.
hypochondriacus, L., Amer., etc.
— var. caudatus, (L.).
— var. speciosus, (Don).
retroflexus, L., Amer., etc.

Ambrosia trifida, L., N. Amer.

Amethystea cœrulea, L., Siberia.

Amsinckia intermedia, F. & M., N. Amer.

Amsonia Tabernæmontana, Walt., N. Amer.

Anacyclus clavatus, P., Eur.
radiatus, Loisl., Eur.

Anagallis arvensis, L., Eur., etc.
— var. carnea, (Schrank).
— var. cœrulea, (Schreb.)
linifolia, L., Eur.

Anchusa italica, Retz, Eur.
officinalis, L., Eur.

Androsace filiformis, Retz, Eur.
lactiflora, Fisch., Siberia.
nana, Horn., Eur.

Andryala sinuata, L., Eur.

Anemone albana, Stev., Orient.
baldensis, L., Eur.
coronaria, L., S. Eur., etc.
decapetala, L., N. Amer.
multifida, Poir., N. Amer.
pratensis, Mill., Eur.
Pulsatilla, L., Eur., etc.
rivularis, Buchan., Himal.
sylvestris, L., Eur.

Anethum graveolens, L., Eur.
Sowa, Roxb., Ind.

Angelica dahurica, Benth. & Hook., Japan.

Anoda hastata, Cav., Mexico.
Wrightii, Gray, Mexico.

Antennaria dioica, Gærtn., Eur., etc.
— var. tomentosa.

Anthemis ætnensis, Schouw., Mt. Etna.
Bourgœi, B. & R., Spain.
Kitaibelii, Spr., Hungary.
maritima, L., Eur.
nobilis, L., Eur.
— var. discoidalis.
peregrina, Willd., S. Eur.
tinctoria, L., Eur.
Triumfetti, Dec., Eur.

Anthericum Hookeri, Colenso, N. Zealand.
Liliago, L., S. Eur., N. Afr.
— var. algeriense, B. & R.
ramosum, L., Eur.

Anthoxanthum odoratum, L., Eur.
Puelii, Lecoq. & Lamotte, Eur.

Anthriscus Cerefolium, Hoffm., Eur.
sylvestris, Hoffm., Eur.

Anthyllis tetraphylla, L., S. Eur.
Vulneraria, L., Eur.

Antirrhinum Asarina, L., Italy.
majus, L., Eur.
Orontium, L., Eur.
rupestre, Boiss. & Reut., Spain.
tortuosum, Bosc, Eur.

Apera interrupta, Beauv., Eur., &c.

Apium graveolens, L., Eur.

Aquilegia Bertolonii, Schott, Ital.
chrysantha, Gray, N. Amer.
flavescens, S. Wats., Californ.
vulgaris, L., Eur.

Arabis albida, Stev., Caucas.
alpina, L., Eur., N. Afr.
blepharophylla, H. & A., N. Amer.
cebennensis, DC., Eur.
hybrida, Reut., Eur.
lilacina, Schrad., N. Amer.
muralis, Bert., var. rosea, DC., Eur.
petræa, Crantz, Eur.
pumila, Jacq., S. Eur.
Soyeri, B. & R., Pyrenees.
Stelleri, DC., var. japonica, Sch., Japan.
stricta, Huds., Eur.
Turczaninowii, Led., Siberia.

Archangelica officinalis, Hoffm., Eur.

Arctium majus, Schk., Eur.
— var. Kotschyi, Hort.

Arenaria fasciculata, Gouan, Eur.
gothica, Fr., Eur.
graminifolia, Schrad., S. Eur.
— var. multiflora.
— var. parviflora.
grandiflora, All., Eur.
gypsophiloides, Schreb., Orient.
hirta, Wormsk., Eur.
laricifolia, L., Eur.
pinifolia, Bbrst., Caucas.
purpurascens, Ram., Pyren.

Argemone mexicana, L., Mexico.

Armeria latifolia, L., Eur.
maritima, Willd., Eur.
— var. alba.
plantaginea, Willd., Eur.
pungens, R.S., Eur.
vulgaris, Willd., Eur.
Welwitschii, Boiss., Spain.

Arnica amplexicaulis, Nutt, N. Amer.
montana, L., Eur.

Arrhenatherum avenaceum, Beauv., Eur.

Artemisia annua, L., S. E. Eur.

Arum italicum, Mill., Eur.
maculatum, L., Eur.

Asparagus officinalis, L., Eur.

Asperula azurea, Jaub. & Spach, Syria.
galioides, Bbrst., Eur.
tinctoria, L., Eur.

Asphodelus albus, Willd., Eur.
fistulosus, L., Eur.

Asprella hystrix, Willd., N. Amer.

Aster acuminatus, Michx., N. Amer.
alpinus, L., Eur.
Amellus, L., Eur.
corymbosus, Ait., N. Amer.
Curtisii, Gray, N. Amer.
diplostephioides, Wall., Himal.
puniceus, L., N. Amer.
— var. lucidulus, Gray.
pyrenæus, DC., Pyren.
Radula, Ait., N. Amer.
scabra, Thunb., China.
tricephalus, C. B. Clarke, Himal.
umbellatus, Mill., N. Amer.
Vahlii, Hook. & Arn., Falk. Isles.

Astragalus ægyptiacus, Spr., Egypt.
alpinus, L., N. Amer.
boeticus, L., Spain, Italy, etc.
chinensis, L., China.
chlorostachys, Ldl., Himal.
Cicer, L., Eur.
dasyglottis, Fisch., Siber.
frigidus, Gray, N. Amer.
glycyphyllus, L., Eur.
scorpioides, Pourr., Spain.

Astrantia Biebersteinii, F. & M., Caucas.
helleborifolia, Salisb., Caucas.
major, L., Eur., etc.
— var. carinthiaca, (Hoppe).
minor, L., Eur.

Athamanta cretensis, L., Eur.
sicula, L., Eur.

Atriplex Babingtonii, Woods, Eur.
hortensis, L., N. Asia.
— var. rubra, Hort.
sibirica, L., Siberia.

Atropa Belladonna, L., Eur.

Aubrietia deltoidea, DC., S. Eur.
— var. græca, (Griseb.).
— var. grandiflora.
— var. Leichtlinii, Hort.
— var. Richardi, Hort.
erubescens, Griseb., Greece.
gracilis, Sprun., Eur.

Avena brevis, Rth., Eur.
distichophylla, Vill., Eur.
pratensis, L., Eur. Siber.
pubescens, Huds., Eur.
sativa, L., Eur.
strigosa, Schreb., Eur.

Baeria gracilis, Gray, W. Calif.
platycarpha, Gray, Calif.

Bahia lanata, DC., N. Amer.

Baptisia australis, R. Br., N. Amer.

Barbarea intermedia, Bor., Eur.
praecox, Br., Eur.
vulgaris, R. Br., Eur.
— var. variegata.

Beckmannia erucæformis, Host, Eur., etc.
— var. uniflorus, Scrib., N. Amer.

Beta trigyna, W. & K., E. Eur.
vulgaris, L., Eur., Afr., etc.

Bidens humilis, H. B. K., Chili.
leucantha, Willd., N. Amer., etc.

Biscutella ciliata, DC., S. Eur.
didyma, L., S. Eur.
— var. apula, L., Eur.
erigerifolia, DC., Spain.

Blumenbachia insignis, Schrad., Monte Video.

Bocconia cordata, W., China.

Boissiera Danthoniae, A. Br., S. Eur.

Boltonia asteroides, L'Her., N. Amer.
incisa, Benth., Siber.

Bonaveria Securidaca, Rch., Eur.

Borago laxiflora, DC., Corsica.

Boykinia major, Gray, N. Amer.

Brachyactis robusta, Benth., Himal.

Brachycome iberidifolia, Benth., Australia.

Brachypodium distachyum, R. & S., Medit.

Brassica balearica, P., Eur.
campestris, L., Eur., etc.
— var. Shantung Cabbage. (B. chinensis, L.)
Eruca, L., S. Eur.
Erucastrum, Vill., S. Eur.
juncea, Hk. f. & Th., N. Ind.
nigra, Koch, Eur.
oleracea, L., Eur.
Pollichii, Shuttl.
rugosa, Roxb., Thibet.
Tournefortii, Gouan, Spain, etc.

Briza geniculata, Thunb., Cape.
maxima, L., Eur.
media, L., Eur.

Brodiæa congesta, Sm., N. Amer.
grandiflora, Sm., Br. Columbia.
peduncularis, Wats., Calif.
uniflora, Bth., Buenos Ayres.

Bromus adœnsis, Hochst.
Biebersteinii, R. & S., Caucas.
breviaristatus, Thurb., N. Amer.
ciliatus, Huds., Eur.
erectus, Huds., Eur., etc.
macrostachys, Desf., Eur.
madritensis, L., Eur.
maximus, Desf., Eur.
mollis, L., Eur., etc.
propendens, Jord., Eur.
racemosus, L., Eur.
sterilis, L., Eur.
Taena, Steud., Chili.
tectorum, L., Eur., Asia.

Browallia demissa, L., Peru.

Bryonia dioica, L., Eur.

Bulbine annua, Willd., Cape.

Buphthalmum speciosum, Schreb., Eur.

Bupleurum Candollei, Wall., Himal.
rotundifolium, L., Eur.

Butomus umbellatus, L., Eur.

Calamagrostis epigeios, Rth., Eur.
varia, P.B., Eur.

Calamintha Clinopodium, Bth., Eur.
grandiflora, Lam., S. Eur.
officinalis, Mœnch, var. umbrosa, Rchb., Eur.
patavina, Host, Eur.

Calandrinia glauca, Schrad., Chili.
Menziesii, Torr. & Gray, N. Amer.
pilosiuscula, DC., Chili.
umbellata, DC., Chili.

Calceolaria mexicana, Benth., Mexico.

Calendula hybrida, L., S. Eur.
officinalis, L., S. Eur.
suffruticosa, Vahl, Spain.

Callipeltis cucularia, Stev., Orient.

Callirhöe involucrata, Gray, N. Amer.

Callistephus chinensis, Nees, China.

Caltha palustris, L., Eur., etc.
— var. minor, Syme.

Camassia esculenta, Ldl., N. Amer.
Fraseri, Torr., N. Amer.

Camelina sativa, Crantz, Eur., etc.

Campanula alliariæfolia, Willd., Caucas.
bononiensis, L., Eur.
carpathica, L. fil., Carpath.
— var. alba.
— var. turbinata, (Schott).
collina, Bbrst., Caucas.
drabifolia, S. & S., Greece.
— var. alba.
Erinus, L., Eur.
excisa, Schl., Switzerland.
glomerata, L., Eur., etc.
— var. dahurica.
lactiflora, Bbrst., Caucas.
latifolia, L., Eur., etc.
— var. macrantha, (Fisch.).
— var. versicolor, (Sib. & Sm.).
latiloba, DC., Olympus.
Medium, L., Eur.
persicifolia, L., Eur., etc.
— var. alba.
— var. maxima
primulæfolia, Brot., Portugal.
pyramidalis, L., Eur.
ramosissima, S. & S., Dalm.
rapunculoides, L., Eur.
reuteriana, Boiss., Asia Minor.
rhomboidalis, L., Eur.
rotundifolia, L., Eur.
Scheuchzeri, Vill., Eur.

Campanula—*cont.*
sibirica, L., Eur., Asia.
spicata, L., Eur.
subpyrenaica, Timb., Eur.
thyrsoides, L., Eur.
Trachelium, L., Eur.

Cannabis sativa, L.

Cardamine græca, L., Greece.
impatiens, L., Eur.

Carduus crispus, L., Eur.
nutans, L., Eur.
orthocephalus, Wallr. × stenolepis, (K. & K.), Siber.
tenuiflorus, Curt., Eur.

Carex adusta, Boot., N. Amer.
Buxbaumii, Whlnb., Eur.
depauperata, Good., Eur.
divulsa, Good., Eur.
flava, L., Eur., etc.
hirta, L., Eur.
hordeiformis, Whlnb., Eur. Cauc.
lagopodioides, Schk., N. Amer.
leporina, L., Eur.
paniculata, L., Eur.
pendula, Huds., Eur.
sylvatica, Huds., Eur.
vulpina, L., Eur.

Carpoceras sibiricum, Boiss., Siber.

Carrichtera Vella, DC., Eur.

Carthamus lanatus, L., S. Eur.
tinctorius, L. Eur.

Carum Carvi, L., Eur.
copticum, Benth., Eur., N. Afr., etc.
rigidulum, Koch, Italy.

Catananche cœrulea, L., Eur.
lutea, L., Italy, etc.

Cathcartia villosa, Hk. f., Himal.

Caucalis daucoides, L., Eur.

Cenchrus tribuloides, L., N. Amer.

Cenia turbinata, Pers., Cape.

Centaurea alba, L., var. deusta, Ten., S. Eur.
atropurpurea, W. & K., Hungary.
axillaris, Willd., Eur.
Crocodylium, L., Orient.
Cyanus, L., Eur.
cynaroides (Less.), Pyrenees.
dealbata, Willd., Caucas.

Centaurea—*cont.*
gymnocarpa, Mor., Eur.
Jacea, L., Eur.
melitensis, L., Eur.
nigrescens, Willd., Eur.
— var. vochinensis, Brh.
nigra, L., Eur.
pulchra, F. & M., Caucas.
Scabiosa, L., Eur.
— var. olivieriana, (DC.)
sonchifolia, L., Medit.
sulphurea, W., Spain.

Centranthus ruber, DC., Eur.

Cephalaria alpina, Schrad., Eur.
tatarica, Schrad., Siberia.
transsylvanica, R.S., Transyl.

Cerastiume hloræfolium, F. & M., Orient.
frigidum, Bbrst., Caucas.
perfoliatum, L., Spain.

Ceratochloa unioloides, DC., S. Eur.

Cerinthe alpina, Kit., Eur.
aspera, Bth., Eur.
maculata, Bbrst., var. auriculata, Ten., Eur.

Chærophyllum aromaticum, Jacq., S. Eur.
aureum, L., Eur.

Charieis heterophylla, Cass., Cape.
— var. rubra.

Chelidonium majus, L., Eur.
— var. fl. pl.
— var. laciniatum.

Chelone Lyoni, Pursh, N. Amer.
nemorosa, Dougl., N. Amer.
obliqua, L., N. Amer.

Chenopodium album, L., Eur.
ambrosoides, L., Eur.
aromaticum, Hort. Berlin.
Atriplicis, L., China.
Bonus-Henricus, L., Eur.
Botrys, L., Eur.
capitatum, Wats., Eur.
graveolens, Willd., Mexico.
opulifolium, Schrad., Eur.
virgatum, Benth. & Hook., S. Eur.

Chloris submutica, H. B., Mexico.

Chlorogalum pomeridianum, Ldl., Calif.

Chorispora tenella, DC., Cauc., etc.

Chrysanthemum Balsamita, L., Orient.
carinatum, Schousb., N. Afr.
— var. atrococcineum.
carneum, Steud., Caucas.
cinerariæfolium, Vis., Dalmatia.
coronarium, L., S. Eur.
— var. album.
— var. fl. pl.
corymbosum, L., Eur.
frutescens, L., Canar.
Leucanthemum, L., Eur.
maximum, DC., Pyrenees.
macrophyllum, W. & K., Eur.
multicaule, Desf., N. Afr.
Parthenium, Pers., Eur.
segetum, L., Eur.
setabense, Duf., Eur.
viscosum, Desf., Spain.

Cicer arietinum, L., Eur.

Cichorium Endivia, L., Orient.
Intybus, L., Eur.

Cimicifuga fœtida, L., Eur.
— var. intermedia.
racemosa, Nutt., N. Amer.

Cladium Mariscus, Br., Eur.

Clarkia elegans, Lindl., Calif.
pulchella, Pursh, N. Amer.
— var. alba.

Claytonia perfoliata, Don, N. Amer.
sibirica, L., N. Amer.

Clematis integrifolia, L., S. Eur.
ochroleuca, Ait., N. Amer.
recta, L., Eur., etc.

Cleome speciosa, H. B., Carthagenia.
violacea, L., Eur.

Clypeola cyclodontea, Delil., Eur.

Cnicus altissimus, Willd., N. Amer.
arachnoideus, Wall., Himal.
canus, Willd., Eur.
ciliatus, Willd., Eur.
fimbriatus, Bieb., Taurus.
horridus, Bbrst., Cauc.
intermedius, Heller, Eur.
lanceolatus, Willd., Eur.
ligulare, Boiss., Orient.
monspessulanus, L., Eur.
ochroleucus. Willd., Eur.
oleraceus, L., Eur.

Cnicus—*cont.*
serrulatus, Bbrst., Eur. Cauc.
syriacus, Willd., Medit.

Cochlearia danica, L., Norway.
glastifolia, L., S. Eur.
officinalis, L., Eur.

Codonopsis ovata, Benth., Himal.

Colchicum speciosum, Stev., Caucas.

Collinsia bartsiæfolia, Benth., Calif.
bicolor, Benth., Calif.
— var. multicolor.
parviflora, Dougl., N. Amer.

Collomia coccinea, Lehm., Chili.
gilioides, Benth., Calif.
grandiflora, Dougl., Calif.
linearis, Nutt., Calif.

Commelina Hasskarlii, Clarke, Ind. or.

Conium maculatum, L., Eur.

Conioselium Fischeri, W.G., Siber.

Conringia perfoliata, Link, Eur.

Convallaria majalis, L., Eur., Amer.
— var. major.

Convolvulus tricolor, L., Medit.
— var. alba.
undulatus, Cav., Medit.

Coreopsis atkinsoniana, Dgl., Oregon.
auriculata, L., N. Amer.
coronata, Hook., E. Texas.
Douglasii, B. & H., Calif.
Drummondi, T. & G. Texas.
grandiflora, Nutt., N., Amer.
maritima, Hook., Calif.
lanceolata, L., N. Amer.
— var. villosa, Michx.
tinctoria, Nutt., N. Amer.
— var. atrosanguinea.

Coriandrum sativum, L., Eur., etc.

Corispermum hyssopifolium, L., S. Eur.

Coronilla vaginalis, Lam., Eur.
varia, L., Eur.

Cortusa Matthioli, L., Eur.
— var. grandiflora.

Corydalis capnoides, Whlnb., Eur.
glauca, Pursh, United States.
nobilis, Pers., Siber.

Corynephorus canescens, Beauv., Eur.

Cosmos bipinnatus, Cav., Mexico.

Cotula coronopifolia, L., Eur.

Crambe pinnatifida, R. & S., Turkest.

Crepis Candollei, Spr., Eur.
grandiflora, Tausch, Eur.
hyoseridifolia, Tausch, Eur.
pulchra, L., Eur.
rubra, L., S. Eur.
setosa, Hall. f., Eur.
tectorum, L. fil., Eur., Siberia.

Crocus bannaticus, Heuffel, Transylvania.
biflorus, Mill., Tuscany.
etruscus, Parl., Tuscany.
Imperati, Ten., Italy.
iridiflorus, Heuffl., Transyl.
medius, Balbis, Riviera.
nudiflorus, Sm., Eur.
pulchellus, Herb., Greece.
sativus, L., Cult.
— var. cartwrightianus, Herb.
Sieberi, Gay, Greece, etc.
speciosus, Bbrst., Caucas., etc.
suaveolens, Bert., Italy.
tommasinianus, Herb., Dalmat.
vernus, All., C. Eur.
versicolor, Ker, Eur.
zonatus, Gay, Cilicia.

Crucianella ægyptiaca, L., Egypt.

Cryptostemma calendulaceum, R.Br., Cape.

Cucubalus bacciferus, L., Eur.

Cuminum Cyminum, L. Egypt.

Cuphea lanceolata, Ait., Mexico.
pinetorum, Benth., Mexico.
viscosissima, Jacq., Amer.
Zimapani, Roezl, Mexico.

Cuscuta Epilinum, Weihe, Eur.

Cynodon Dactylon, Pers., Eur.

Cynoglossum officinale, L., Eur.
pictum, Ait., Eur.

Cynosurus cristatus, L., Eur.
echinatus, L., S. Eur.

Czackia Liliastrum, Andrz., S. Eur.

Dactylis glomerata, L., Eur., etc.

Dahlia coccinea, Cav., Mexico.
scapigera, L. & O., Mexico.
variabilis, Desf., Mexico.

Datura lævis, L. fil., Africa.
Stramonium, L., Eur.
Tatula, L., Eur., etc.
— var. gigantea.

Daucus Carota, L., Eur., etc.

Delphinium Ajacis, Reichb., S. Eur.
brunonianum, Royle, Himal.
cardiopetalum, DC., Eur.
caucasicum, L., Caucas.
Consolida, L., Eur.
crassifolium, Schrad., Cauc.
— var. turkestanicum.
dictyocarpum, DC., Siberia.
elatum, L., Eur., etc.
— var. alpinum, W. K.
— var. intermedium.
formosum, Hort.
grandiflorum, L., China, etc.
maackianum, Regel, Asia Minor.
orientale, Gay, Eur., Orient.
Staphisagria, L., Eur.
triste, Fisch., Siberia.
trolliifolium, Gray, Amer.
vestitum, Wall., Himal.

Deschampsia cæspitosa, Beauv., Eur.
flexuosa, Trin., Eur.

Desmazeria sicula, Dmrt., Eur.

Dianthus arenarius, L., Eur.
atrorubens, All., Eur.
callizonus, Sch. & Ky., Transyl.
Caryophyllus, L., Eur.
cæsius, Sm., Eur.
fragrans, Bbrst., Caucas.
intermedius, Boiss., var. ambiguus, Panc., Servia.
longicaulis, Ten., Italy.
monsspesulanus, L., Eur.
Mussinii, Hornm., Caucas.
pelviformis, Heuffl., Transyl.
petræus, W. & K., E. Eur.
plumarius, L., Eur.
prolifer, L., Eur.
pubescens, S. S., S. Eur.
pulchellus, Pers., Eur.
Requienii, G. & G., S. Eur.
superbus, L., Eur.

Dianthus—*cont.*
squarossus, Bbrst., Russia.
tener, Balb., Eur.
tymphresteus, H. S., Greece.

Dictamnus albus, L., W. Eur., Jap.
— var. purpureus.

Digitalis ferruginea, L., Eur.
grandiflora, Lam., Eur.
lutea, L., Eur.
media, Roth, (ambigua × lutea.)
orientalis, Lam., Thrace.
purpurea, L., Eur.
— var. alba, Hort.

Dimorphotheca annua, Less., Cape.

Dioscorea pyrenaica, Bub. & Bord., Pyren.

Dipcadi serotinum, Medic., S. Eur., Afr.

Diplotaxis tenuifolia, DC., Eur.

Dipsacus asper, Wall., Himal.
Fullonum, L.
laciniatus, L., Eur.
sylvestris, L., Eur.

Dodecatheon Meadia, L., N. Amer.
— var. macrocarpum, Gray.

Dorycnium herbaceum, Vill., Eur.

Draba aizoides, L., Eur.
arabisans, Michx., N. Amer.
borealis, DC., Isl. of St. Paul.
carinthiaca, Hpe., Eur.
frigida, Saut., Alps, Eur.
incana, L., Eur.
— var. Thomasii, K.
Kotschyi, Stur, Transyl.
lactea, Ad., Eur.
lasiocarpa, Reichb., S. Eur.
Loiseleurii, Boiss., Corsica.
stellata, Jacq., Transyl.

Dracocephalum argunense, Fisch., Siber.
Moldavica, L., Siber., etc.
nutans, L., Siberia.
parviflorum, Nutt., N. Amer.
peregrinum, L., Siberia.

Dryas octopetala, L., Eur., Amer.

Echinops globifer, Janka, Transyl.
sphærocephalus, L., Eur.

Echium plantagineum, L., Eur.

Eleusine coracana, Pers., Ind. Or.
oligostachya, Link, Brazil.

Elsholtzia cristata, Willd., S. Eur.

Elymus canadensis, L., N. Amer.
— var. glaucifolius, Gray.
sibiricus, L., Siber.
virginicus, L., N. Amer.

Emex spinosa, Camb., S. Eur.
Encelia subaristata, Gray, N. Amer.

Epilobium alpestre, Jacq., Eur.
alsinefolium, Vill., Eur.
angustifolium, L., Eur.
— var. album.
Billardieri, Sering., Austral.
Fleischeri, Hochst., Eur.
hirsutum, L., Eur.
Lamyi, Schultz, S. Eur.
linnæoides, Hook. fil., N. Zeal.
montanum, L., Eur.
nummulariæfolium, A. Cunn., N. Zeal.
— var. longipes.
— var. pedunculare, Cunn.
parviflorum, Retz, Eur.
roseum, Retz, Eur.
rosmarinifolium, Hænke, Eur.
— var. sericeum.
tetragonum, L., Eur.
trigonum, Schrk., Eur.

Eragrostis nutans, Nees., Ind. Or.
poæoides, Beauv., Eur., etc.

Eranthis hyemalis, Salisb., Eur.

Eremurus altaicus, Stev., Altai.
Kaufmanni, Regel, Turkestan.

Erigeron aurantiacus, Regel, Turkestan.
glabellus, Nutt., N. Amer.
— var. asperus, Gray.
pulchellus, Regel, Turkestan.
speciosus, DC., Calif.
strigosus, Muhl., N. Amer.

Erinus alpinus, L., Eur.
— var. albus.

Eritrichium strictum, Dcne., Himal.

Erodium guttatum, Willd., Spain.
hymenodes, L'Herit., Atlas.
macradenium, L'Herit., Alps.
moschatum, L'Herit., Eur.
romanum, W., Eur.

Erodium—*cont.*
serotinum, Stev., Orient.
trichomanefolium, L.'Herit., Spain.
tmoleum, Reut., Asia Minor.

Ervum Lens, L., Eur., etc.

Eryngium giganteum, Bbrst., Caucas.
oliverianum, Delar., Orient.
planum, L., Eur.
triquetrum, Vahl, Sicily.

Erysimum aureum, Bbrst., Eur., Orient.
boryanum, Boiss., Eur. Or.
hieracifolium, L., Eur.
marshallianum, Andrz., Siber.
perowskianum, Fisch. & Mey., Caucus.

Erythræa Centaurium, P., Eur.

Eschscholtzia californica, Cham., Calif.
— var. alba.
— cæspitosa, Brewer.

Eucharidium concinnum, F. & M., Calif.
— var. grandiflorum.

Eupatorium ageratoides, L., N. Amer.
cannabinum, L., Eur.

Euphorbia Bornmülleri, Haussk., Orient.
exigua, L., Eur.
flavicoma, DC., Eur.
hierosolymitana, Boiss., Syria.
Myrsinites, L., Eur.
Peplis, L., Eur.
platyphylla, L., Eur.
Preslii, Guss., Eur.
segetalis, L., Eur.
stricta, L., Eur.

Fagopyrum esculentum, Moench, Eur., &c.
tataricum, Gaertn., Eur., &c.

Farsetia clypeata, Br., S. Eur.

Fedia Cornucopiæ, G., Eur.

Felicia fragilis, Cass., Afr.

Ferula communis, L., Eur.
Ferulago, L., Eur.
glauca, L., S. Eur.
— var. candelabra, Heldr.

Festuca ampla, Hack., Eur.
capillifolia, Duf., Spain.
delicatula, Lag., Eur.
duriuscula, L., Eur., Amer.
— sub-var. crassifolia.
elatior, L., Eur., etc.
— var. pratensis, (Huds.)
gigantea, Vill., Eur.
Halleri, All., S. Eur.
heterophylla, Lam., Eur.
Lachenalii, Spenn., Eur.
Myurus, L., Eur.
Panciciana, Hack., Orient.
rigida, Kunth, Eur.
sciuroides, Roth, Eur.
scoparia, Kern., Pyren.

Fritillaria armena, Boiss., Asia Minor.
delphinensis, Gren., Eur.
— var. Moggridgei, (Boiss. & Reut.).
Meleagris, L., Eur.
— var. alba.
pontica, Wahl., Bithyn.
ruthenica, Wikstr., Orient.

Funkia lancifolia, Spr., Japan.
— var. albo-marginata, Hort.
ovata, Spr., Japan.
sieboldiana, Lodd., Japan.

Galega officinalis, L., Eur.
orientalis, Lam., Orient.

Galeopsis pyrenaica, Bartl., Pyren.

Galinsoga brachystephana, Regel, S. Amer.
parviflora, Cav., Amer.

Galium boreale, L., Eur.
gracile, Ledeb., Caucas.
Mollugo, L., Eur.
parisiense, L., Eur.
recurvum, Reg., Greece.
saccharatum, All., Eur.
tenuissimum, Bbrst., Cauc.
tricorne, With., Eur.
uliginosum, L., Eur.
verum, L., Eur.

Gaudinia fragilis, P.B., S. Eur.

Gaura parviflora, Dougl., N. Amer.

Gentiana acaulis, L., Eur.
asclepiadea, L., S. Eur.
— var. alba.
cruciata, L., Eur. Siber.

Gentiana—*cont.*
lutea, L., Eur.
Pneumonanthe, L., Eur.
septemfida, Pall., Caucas.
tibetica, King, Himal.

Geranium albanum, M. B., Tauria.
armenum, Boiss., Orient.
balkanum, Hort.
eriostemon, Fisch., Caucas.
Londesii, Fisch., Siber.
lucidum, L., Eur.
maculatum, L., N. Amer.
nodosum, L., Eur.
palustre, L., Eur.
pratense, L., Eur.
— var. alba.
pusillum, L., Eur.
sylvaticum, L., Eur.
vlassovianum, Fisch., Siber.
wallichianum, Sw., Himal.
Wilfordi, Maxim., Manchuria.

Gerbera Anandria, Schultz., China, Japan.

Geum chiloense, Balb., Chili.
hispidum, Fr., Spain.
inclinatum, Schleich., Eur.
macrophyllum, Willd., Siber.
montanum, L., Alps, Eur.
pyrenaicum, Mill., Pyrenees.
rivale, L., Eur.
strictum, Ait., N. Amer.
triflorum, Pursh, N. Amer.
tyrolense, Kern., Tyrol.
urbanum, L., Eur., etc.

Gilia achilleæfolia, Bth., Calif.
androsacea, Steud., Calif.
— var. rosea.
capitata, Dougl., Calif.
inconspicua, Dougl., Calif.
laciniata, R. & P., Chili, Peru.
leucocephala, Gray, Calif.
micrantha, Steud., Calif.
squarrosa, Hook. & Arn., Amer.
tricolor, Benth., Calif.
— var. alba.

Gillenia trifoliata, Moench, N. Amer.

Gladiolus segetum, Gawl., S. Eur.

Glaucium corniculatum, Curt., S. Eur.
— var. rubrum, Hort.

Glaucium—*cont.*
flavum, Crantz, var. fulvum, Sm.

Glyceria maritima, Wahl., Eur.
remota, Fr., Eur.

Gnaphalium indicum, L., India.
luteo-album, L., Eur.

Gratiola officinalis, L., Eur.
— var. minor.

Gunnera scabra, R. & P., Peru, etc.

Gypsophila cerastoides, Don, Himal.
paniculata, L., Siberia.
repens, L., Eur.
Rokejeka, Del., Egypt.

Hablitzia tamnoides, Bbrst., Caucas.

Hastingia alba, S. Wats., N. Amer.

Hebenstreitia comosa, Hochst., Cape.
dentata, Thunb., Cape.
tenuifolia, Schrad., Cape.

Hedysarum boreale, Nutt., N. Amer.
coronarium, L., Eur.
flexuosum, L., Eur.
microcalyx, Baker, Himal.
neglectum, Ledeb., Altai.
obscurum, L., Eur.
Sibthorpii, Nym., S. Eur.

Helenium Bolanderi, Gray, N. Amer.

Helianthemum polifolium, Mill., Eur.
vulgare, Gærtn., Eur.

Helianthus annuus, L., N. Amer.

Helichrysum bracteatum, Willd., Austral.
— var. album.
— var. luteum.
serotinum, Boiss., S. Eur.

Heliophila amplexicaulis, L. fil., Cape.
araboides, Sims, Cape.
crithmifolia, Willd., Cape.

Helipterum Manglesii, Bth., Austral.
Milleri, Hort., Australia.
roseum, Benth., Australia.

Helleborus colchicus, Regel.
foetidus, L., Eur.
orientalis, Lam., Greece.
— var. roseus.

Helminthia echioides, G., Eur.

Helonias bullata, L., N. Amer.
— var. latifolia.

Hemerocallis flava, L., S. Eur.
fulva, L., S. Eur., etc.
— var. Kwanso, Regel.

Heracleum Panaces, L., S. Eur.
pubescens, Bbrst., var. gummiferum, Willd., Eur.
villosum, Fisch., Russia.

Hesperis matronalis, L., Eur., Siber.

Heuchera cylindrica, Dougl., N. Amer.
Drummondi, Hort.
glabra, Willd., N. Amer.
pilosissima, F. & M., N. Amer.
sanguinea, Eng., N. Amer.

Hibiscus Trionum, L., Cosmopol.

Hieracium alpinum, L., Eur.
aurantiacum, L., Eur.
integrifolium, Lge., Eur.
Jankæ, Uechtr., E., Eur.
lanatum, W. & K., Eur.
longifolium, Schleich., Eur.
maculatum, Sm., Eur.
nigrescens, W., Eur.
onosmoides, Fr., Eur.
pallidum, Biv., Eur.
pratense, Tausch, Eur.
saxatile, Jacq., S. Eur.
stoloniflorum, W. & K., S. Eur.
villosum, L., Eur.
virgatum, Pursh, N. Amer.
vulgatum, Fr., Eur.

Hierochloa borealis, R.S., N. Zeal.

Holcus lanatus, L., Eur.

Hordeum jubatum, L., Eur.
maritimum, With., Eur.
murinum, L., Eur.
vulgare, L., Sicily.

Horminum pyrenaicum, L., Pyren.

Hyacinthus amethystinus, L., Spain.
romanus, L., S. Eur., etc.

Hydrophyllum canadense, L., N. Amer.
virginicum, L., N. Amer.

Hymenophysa pubescens, Meyer, Siber.

Hyoscyamus aureus, L., Crete.
niger, L., Eur.
— var. albus, Hort.
orientalis, Bbrst., Cauc.

Hypecoum grandiflorum, Benth., Medit. Caucas.
procumbens, L., S. Eur.

Hypericum atomarium, Boiss., Greece.
elodioides, Chois., Nepal.
perfoliatum, L., Eur.
perforatum, L., Eur.
Richeri, Vill., Eur.
— var. Burseri, Sp., Transs.
tetrapterum, Fr., Eur.

Hypochæris arachnoidea, Poir., N. Afr.

Hyssopus officinalis, L., Eur.

Iberis amara, L., Eur.
ciliata, All., Alp. Marit.
garrexiana, All., Pyrenees.
lagascana, DC., Spain.
pectinata, Boiss., Spain.
umbellata, L., S. Eur.
— var. carnea.

Impatiens amphorata, Edg., Himal.
bicornuta, Wall., Nepal.
parviflora, DC., Siberia, etc.
Roylei, Walp., Himal.
scabrida, Wall., Nepal.

Inula ensifolia, L., Eur.
glandulosa, Willd., Caucas.
grandiflora, Willd., Caucas., etc.
Helenium, L., Eur.

Iris aurea, Ldl., Himal.
fulva, Muhl., N. Amer.
missouriensis, Nutt., N. Amer.
Pseudacorus, L., Eur., etc.
setosa, Pallas, Siberia.
— var. atropurpurea.
sibirica, L., Eur., Siberia.
spuria, L., Eur.
— var. notha, Bbrst.
versicolor, L., N. Amer.

Isatis tinctoria, L., Eur., etc.

Isopyrum fumarioides, L., Eur. As.

Iva xanthifolia, Nutt., Missouri.

Juncus acutus, L., Eur.
balticus, Willd., Eur.
Chamissonis, Benth., Chili.
compressus, Jacq., Eur.
effusus, L., Eur.
glaucus, Ehrh., Eur.
lamprocarpus, Ehrh., Eur.
maritimus, Lam., Eur.
platycaulis, H.B.K., S. Amer.
squarrosus, L., Eur.
tenuis, Wild., Eur.

Kochia scoparia, Schrad., Eur.

Kœleria Berythea, B. & B., Syria.
cristata, Pers., Eur.
phleoides, P., Eur.

Lactuca canadensis, L., N. Amer.
hirsuta, L., N. Amer.
ludoviciana, Riddel, N. Amer.
muralis, Fres., Eur.
Plumieri, Gren. & Godr., S. Eur.
undulata, Ledeb., Siberia.

Lallemantia canescens, F. & M., Caucas.
peltata, Fisch. & Mey., Caucas.

Lamarckia aurea, Mœnch, Eur.

Lathyrus angulatus, L., S. Eur.
Aphaca, L., Eur.
articulatus, L., W. Eur.
aureus, Benth. & Hook., Taur.
Clymenum, L., S. Eur.
filiformis, Lam., S. Eur.
hirsutus, L., Eur.
latifolius, L., Eur.
— var. ensifolius, Bad.
luteus, B. & Hk. f., Eur., etc.
macrorrhizus, Wimm., Eur.
niger, Wimm., Eur.
Ochrus, L., Eur.
pannonicus, Gcke., var. varius, Sol., Eur.
pisiformis, L., Siberia, etc.
rotundifolius, Willd., Caucas.
sativus, L. var. albus.
sphæricus, Retz, Eur.
sylvestris, L., Eur.
— var. Wagneri.
tingitanus, L., N. Afr.

Lathyrus—*cont.*
tuberosus, L., Eur.
venosus, Muhl., N. Amer.

Lavatera Olbia, L., Eur.
thuringiaca, L., Eur., etc.
trimestris, L., Medit.
— var. alba.

Layia Calliglossa, Gray, Calif.
elegans, T. & G., Calif.
glandulosa, Hk. & Arn., Calif., etc.

Leontopodium alpinum, Cass., Eur.
sibiricus, L., Siber.
tataricus, L., Asia.

Lepidium calycotrichum, Kze., Eur.
Draba, L., Eur.
graminifolium, L., Eur.
incisum, Roth, Eur.
Menziesii, DC., N. Amer.
sativum, L., Eur.
virginicum, L., N. Amer.

Leptochloa fascicularis, Gr., N. Amer.

Lepturus cylindricus, Trin., Eur.

Leuzea conifera, DC., Eur.

Liatris spicata, Willd., N. Amer.
— var. montana, Gray.

Libanotis montana, Crantz, Eur.
sibirica, Koch, Eur., etc.

Ligusticum pyrenæum, Gouan, Pyrenees.
scoticum, L., Eur.
Seguieri, Koch, S. Eur.

Linaria anticaria, Boiss., Spain.
bipartita, Willd., N. Afr.
Broussonetii, Poir., Orient.
chalepensis, Mill., Eur.
dalmatica, Mill., Dalm.
genistæfolia, Mill., Eur.
— var. linifolia, Grab.
italica, Trev., Eur.
minor, Desf., Eur., N. Afr.
minutiflora, Mey., Caucas.
peloponnesiaca, Boiss., Greece.
Perezii, Gay, Eur.
prætermissa, Delas., France.
purpurea, L., Eur., etc.
reticulata, Desf., N. Afr.
— var. purpurea.

Linaria—*cont.*
saxatilis, Hffgg., Eur.
spartea, Hoffm., S. Eur.
triphylla, Willd., S. Eur.
tristis, Mill., S. Eur.

Lindelophia spectabilis, Lehm. Himal.

Lindheimera texana, Gray & Engelm., Texas.

Linum alpinum, L., Eur.
angustifolium, L., Eur.
flavum, L., Eur.
grandiflorum, Desf., N. Afr.
— var. coccineum.
nervosum, W. & K., Eur.
perenne L., Eur., etc.
— Lewisii, (Mhlbrg.)
usitatissimum, L., Eur.

Lithospermum latifolium, Michx., N. Amer.

Loasa ambrosiæfolia, Juss., Peru.
lateritia, Gill. & Hook., Chili.
volcanica, Andr., New Gren.

Lobelia Erinus, L., Cape.
Tupa, L., Chili.

Lolium perenne, L., Eur.
— var. italicum, (Braun).

Lonas inodora, Gærtn., Sicily.

Lopezia coronata, Andr., Mexico.

Lophanthus rugosus, F. & M., China.

Lotus corniculatus, L., Eur.
— var. Delorti, Timb.
major, Scop., Eur.
ornithopodioides, L., Eur.
siliquosus, L., Eur.
tenuis, W. & K., Eur., etc.
Tetragonolobus, L., Eur.

Lunaria annua, L., Eur.
rediviva, L., S. Eur.

Lupinus affinis, Agardh, N. Amer.
angustifolius, L., S. Eur.
— var. macrocarpus, Hort.
arboreus, Sims, N. Amer.
Cosentini, Guss., Greece, etc.
elegans, H. B. K., Mexico.
micranthus, Dougl., N. Amer.
mutabilis, Sw., Bogota.
polyphyllus, Ldl., N. Amer.

Lupinus—*cont.*
pubescens, Benth., N. Amer.
pulchellus, Sweet, Mexico.
recurvatus, Meyer, Chili.
subcarnosus, Hook., Texas.
tricolor, Hort.
varius, L., Eur.

Luzula angustifolia, Poir., Carolina.
campestris, DC., Eur.
nivea, Desv., Eur.

Lychnis alba, Mill., Eur.
alpina, L., Eur.
chalcedonica, L., E. Eur., etc.
coronaria, Lam., Eur.
diurna, Sibth., Eur.
Flos-cuculi, L., Eur.
Flos-jovis, Desv., S. Eur.
Githago, Lam., Eur.
Lagascæ, Nym., Eur.
læta, Ait., S. Eur., etc.
oculata, Ldl., Levant.
— var. elegans.
pauciflora, Ledeb., Siber.
Viscaria, L., Eur.

Lysimachia acroadenia, Maxim., Japan.
barystachya, Bunge, Japan.
clethroides, Dub., Japan.
ciliata, L., N. Amer.
davurica, Willd., Davuria.
longifolia, Pursh, N. Amer.
punctata, L., Eur.
quadrifolia, L., N. Amer.
vulgaris, L., Eur.

Lythrum Salicaria, L., Eur.
— var. rosea.

Madia elegans, Don, N. Amer.
sativa, Molin., Oregon, Calif.
— var. racemosa, Gray.

Malcolmia africana, R.Br., S. Eur., N. Afr.
chia, DC., Greece.
littorea, R.Br., S. Eur.
maritima, R.Br., S. Eur., etc.

Malope trifida, Cav., N. Afr.
— var. alba.

Malva Alcea, L., Eur.
crispa, L., Orient.
Duriæi, Spach, N. Afr.
moschata, L., Eur.
— var. alba.

Malva—*cont.*
oxyloba, Boiss., Orient
parviflora, L., Eur.
sylvestris, L., Eur., etc.
— var. alba.

Malvastrum limense (L.), Chili.

Mandragora vernalis, Bert., Orient.

Marrubium astracanicum, Jacq., Caucas.
pannonicum, Rchb., Eur.
peregrinum, L., Eur.
vulgare, L., Eur.

Matricaria caucasica, Benth., Caucas.
inodora, L., Eur.
— var. discoidea (DC.).

Matthiola bicornis, DC., Eur.

Meconopsis cambrica, Vig., Eur.
nepalensis, DC., Nepal.
wallichiana, Hook., Himal.

Medicago apiculata, W., Eur.
Echinus, DC., S. Eur.
lappacea, Desr., S. Eur.
— var. denticulata, W., Eur.
littoralis, Rhod., Eur.
lupulina, L., Eur.
marina, L., Eur.
minima, Desr., Eur.
murex, Willd., Eur.
muricata, All., Eur.
orbicularis, Willd., S. Eur.
radiata, L., Orient.
sativa, L., Eur.
tuberculata, W., Eur.
turbinata, W., Eur.

Melica altissima, L., Eur.
ciliata, L., Eur., etc.
— var. penicillaris, (Boiss.)
glauca, F. Sz., var. nebrodensis, Parl., Eur.
nutans, L., Eur.

Melilotus alba, Desr., Eur.
officinalis, Desr., Eur.
parviflora, Lam., Eur.

Melissa officinalis, L., Eur.

Melittis Melissophyllum, L., Eur.

Mentzelia Lindleyi, T. & G., Calif.

Mercurialis annua, L., Eur.

Mesembryanthemum cordifolium, L., Cape.
tricolor, Willd., Cape.
— var. album.

Microseris acuminata, Greene, Calif.
Douglasii, Gray, Calif.
leucocarpus, Greene, Calif.
Lindleyi, Gray, Calif.

Mimulus cardinalis, Dougl., N. Amer.
cupreus, Veitch, Chili.
glabratus, H. B., Mexico.
luteus, L., N. Amer.
moschatus, Dougl., N. Amer.

Mirabilis Jalapa, L., W. Ind.
longiflora, L., Mexico.

Modiola multifida, Moench, N. Amer.

Molinia cærulea, Mœnch, Eur.
— var. variegata.

Momordica Elaterium, L., Eur.

Monolepis chenopodioides, Moq., N. Amer.

Morina longifolia, Wall., Nepal.

Moscharia pinnatifida, R. & P., Chili.

Muehlenbergia glomerata, Trin., N. Amer.
mexicana, Trin., N. Amer.
sylvatica, T. & G., N. Amer.
Willdenovii, Trin., N. Amer.

Muscari Argaei, Hort.
armeniacum, Baker, Medit.
atlanticum, Boiss., Spain, Algeria.
grandifolium, Baker.
Heldreichii, Boiss., Greece.
moschatum, Willd., Caucas.
neglectum, Guss., S. Eur.
racemosum, Mill., Eur.
szovitsianum, Regel, Siber.

Myosotis arvensis, Hoffm., Eur.
cæspitosa, K. F. Sch., Eur.
collina, Hoffm., Eur.
sylvatica, Hoffm., Eur.

Myosurus minimus, L., Eur., etc.

Myrrhis odorata, Scop., Eur.

Nardurus tenellus, Rchb., Spain.

Nardus stricta, L., Eur.

Nemesia floribunda, Lehm., Cape.
pubescens, Benth., Cape.
versicolor, Mey., Cape.

Nemophila aurita, Lindl., Calif.
insignis, Dougl., Calif.
— var. grandiflora, Hort.
parviflora, Dougl., N. Amer.

Nepeta Cataria, L., Eur.
Mussini, Bbrst., Caucas.
Nepetella, L., Eur.
nuda, L., Eur.

Nicandra physaloides, Gærtn., Peru.

Nicotiana Langsdorffii, Weinm., Brazil.
paniculata, L., S. Amer.
rustica, L., S. Eur., etc.
Tabacum, L., S. Amer.

Nigella damascena, L., S. Eur.
integrifolia, Regel, Cent. Asia
sativa, L., S. Eur.

Nolana atriplicifolia, Don, Peru.
prostrata, L., Peru, Chili.

Nothoscordum fragrans, Kunth, Amer.

Notobasis syriaca, Cass., Eur. Or.

Œnanthe crocata, L., Eur.
globulosa, L., S. Eur.
gymnorrhiza, Brign., C. & S., Eur.
karsthia, Hacq., Carniol.
peucedanifolia, Poll., Eur.
pimpinelloides, L , Eur.
silaifolia, Bbrst., Eur.

Œnothera amœna, Lehm., Calif.
— var. rubicunda, Hort.
berteriana, Spach, Chili.
biennis, L., N. Amer.
bistorta, Nutt., N. Amer.
densiflora, Lindl., Calif.
dentata, Cav., N. Amer.
epilobifolia, H. B., N. Granada.
fruticosa, L., N. Amer.
— var. Youngii, Hort.
glauca, Michx., N. Amer.
mollissima, L., Buenos Ayres.
odorata, Jacq., Patagonia.
pumila, L., N. Amer.
rosea, Ait., N. Amer.
speciosa, Nutt., N. Amer.

Œnothera—*cont.*
tenella, Cav., Chili.
tetraptera, Cav., Mexico.
triloba, Nutt., N. Amer.

Omphalodes linifolia, Moench, Eur.

Ononis arvensis, Mur., Eur.
Natrix, L., S. Eur.
rotundifolia, L., Eur.
spinosa, L., Eur., etc.
— var. alba.
repens, L., Eur.

Onopordon Acanthium, L., Eur.
tauricum, Willd., Eur.
sibthorpianum, Boiss., S. Eur.

Opopanax Chironium, Koch, Eur.

Orchis foliosa, Sol., Madeira.
incarnata, L., Eur.
latifolia, L., Eur.
maculata, L., Eur.
— var. superba.

Origanum vulgare, L., Eur.
— var. album.

Ornithopus perpusillus, L., Eur.

Ornithogalum arcuatum, Steven, Cauc.
latifolium, L., Egypt, etc.
narbonense, L., Eur.
orthophyllum, Ten., Italy.
tenuifolium, Guss., Eur.
umbellatum, L., Eur., etc.
— var. Leichtlinii.

Orobanche minor, Sm., Eur.
ramosa, L., Eur.

Oxyria elatior, R. Br., Nepal.

Oxytropis campestris, DC., Eur.
ochroleuca, Bunge, Siber.

Pachypodium erysimoides, Web., N. Amer.

Pæonia arietina, Anders., Orient.
— var. Andersoni.
decora, Anders., Orient.
— var. Pallasii, Hort.
peregrina, Mill., Orient.

Palafoxia texana, DC., Texas.

Palava flexuosa, Mast., Peru.

Pallenis spinosa, Cass., Eur.

Panicum capillare, L., N. Amer.
colonum, L., N. India.
Crus-galli, L., S. Eur.
eruciforme, Sibth., Ind. or.
miliaceum, L., Asia.
proliferum, Lam., N. Amer.
sanguinale, L., Eur.

Papaver Argemone, L., Eur.
caucasicum, Bbrst., Caucas.
dubium, L., Eur.
— var. Lecoqii (Lamotte), Eur.
gariepinum, Burch., S. Afr.
glaucum, Boiss., Orient.
lævigatum, Bieb., Taurus.
lateritium, C. Koch, Armen.
nudicaule, L., Alps.
— var. album.
orientale, L., Orient.
— var. bracteatum, (Lindl.).
— var. majus.
pavoninum, C. A. Mey., Afghan.
pilosum, Sibth., Greece.
— var.
Rhœas, L., Eur.
— var. Hookeri, (Baker).
— var. "Shirley."
rupifragum, Boiss., Spain.
— var. atlanticum, Ball, G. Atlas.
somniferum, L., China, etc.
— var. "Danebrog."
— var. fl. pl.
— var. setigerum, (DC.)

Parietaria lusitanica, L., Eur.
officinalis, L., Eur.

Parnassia nubicola, Hook. fil., Himalaya.
palustris, L., Eur.

Pennisetum cenchroides, Rich., Afr.
orientale, Pers., Galatia.
villosum, R. Br. Fres., Abyss.

Pentstemon barbatus, Nutt., N. Amer.
— var. Torreyi, Gray.
campanulatus, Willd., Mexico.
cœruleus, Gray, N. Amer.
confertus, Dougl., N. Amer.
diffusus, Dougl., N. Amer.
glaber, Pursh, N. Amer.

Pentstemon—*cont.*
Hartwegii, Benth., Mexico.
lævigatus, Sol., var. Digitalus, Gray, N. Amer.
ovatus, Dougl., N. Amer.
pubescens, Sol., N. Amer.
Richardsonii, Dougl., Columbia.

Perezia multiflora, Less., Peru, etc.

Petroselinum sativum, Hoffm., Eur.

Petunia nyctaginiflora, Juss., La Plata.

Peucedanum coriaceum, Rchb., Eur.
Ostruthium, K., Eur.
parisiense, DC., Eur.
paucifolium, Ledeb., Siber.
sativum, Benth., Eur.

Phaca oroboides, DC., Eur.

Phacelia campanularia, Gray, Calif.
divaricata, Gray, Calif.
Parryi, Torr., Calif.
tanacetifolia, Bth., Calif.
viscida, Torr., Calif.
Whitlavia, Gray, Calif.
— var. alba, Hort.

Phænospherma globosa, Munro., China.

Phalaris canariensis, L., S. Eur.
paradoxa, L., S. Eur.
tuberosa, L., Eur.

Phaseolus multiflorus, Lam.
ricciardianus, Ten.
tuberosus, Lour., Cochinchina.
vulgaris, L., India.
wightianus, Grah., India.

Phleum asperum, Jacq., Eur.
Bœhmeri, Wib., Eur.
pratense, L., Eur.
— var. nodosum, (L.)

Phlomis russeliana, Lagas., Orient.
setigera, Falc., Himal.
tuberosa, L., Caucas.
umbrosa, Turcz., Siberia.

Phlox Drummondi, Hook., Calif.
— var. cuspidata.
paniculata, L., N. Amer.
— var. alba.
stellaria, Gray, N. Amer.

Physalis Alkekengii, L., Eur.
angulata, L., Ind. Or.
peruviana, L., Peru.

Physostegia virginiana, Benth., var. speciosa, Gray, N. Amer.

Phyteuma Halleri, All., S. Eur.
limonifolium, Sibth. & Sm., Eur.
Michelii, All., Eur.
nigrum, Schmidt, Germ.
orbiculare, L., Eur.
spicatum, L., Eur.

Phytolacca acinosa, Roxb., India.

Picridium tingitanum, Dsf., Eur.

Picris hieracioides, L., Eur.

Pimpinella Anisum, L., Eur.
magna, L., Eur.

Pisum elatius, Stev., Eur.
sativum, L., Eur.

Plantago amplexicaulis, Cav., Eur.
arenaria, L., Eur.
Coronopus, L., Eur.
Cynops, L., Eur.
gnaphalioides, Gray, N. Amer.
Ispaghula, Roxb., India.
lagopus, L., Eur.
lanceolata, L., Eur.
major, L., Eur.
maritima, S., Eur.

Platycodon grandiflorum, A.DC., Siber.
— var. Mariesii, Hort.

Platystemon californicus, Benth., Calif.

Pleurospermum pulchrum, Aitch. & Hemsl., Afghan.

Poa alpina, L., Eur.
— var. badensis, Hke.
cæsia, Sm., Eur.
chinensis, L., China.
compressa, L., Eur.
glauca, Sm., Eur.
palustris, L., Eur.
pratensis, L., Eur.
sudetica, Haenke, Eur.
trivialis, L., Eur.
violacea, Bell, Eur.

Podolepis acuminata, R. Br., Austral.

Podophyllum Emodi, Wall., Himal.

Polemonium cæruleum, L., Eur., Amer., etc.
— var. album, Hort.
flavum, Greene, Amer.
himalayanum, Baker, Himal.
pauciflorum, Wats., Mexico.
reptans, L., N. Amer.

Pollinia Gryllus, Spr., Eur.

Polygonatum verticillatum, All., Eur.

Polygonum aviculare, L., Eur.
Bistorta, L., Eur.
capitatum, Don, Himalaya.
molle, Don, Himal.
orientale, L., Eur. Orient.
viviparum, L., Eur.
Weyrichii, F. Schm., Sachal. Isl.

Polypogon monspeliensis, Dsf., Eur.

Potentilla alchemilloides, Lap., Pyrenees.
argentea, L., Eur.
— var. calabra, Ten.
argyrophylla, Wall., Himal.
aurea, L., Eur., var. ambigua, Gaud.
chinensis, Ser., China.
collina, Wib., Eur.
crocea, Hall. f., Eur.
Detommasii, Ten., Eur.
dichtliana, Kern., Eur.
digitata × flabellata.
glandulosa, Ldl., Calif.
heptaphylla, Mill., Eur.
kotschyana, Fenzl., Kurdistan.
kurdica, Boiss., Orient.
leschenaultiana, Ser., Ind., Or.
malacophylla, Bunge, Orient.
montenegrina, Panc., Montenegro.
nepalensis, Hook., Nepal.
nevadensis, Boiss., Spain.
opaca, L., Eur.
pedata, Willd., France.
pennsylvanica, L., N. Amer.
— var. arachnoidea, Lehm.
pseudo-chrysantha.
pyrenaica, Ram., Pyren.
recta, L., Eur., Caucas.
— var. laciniata.
— var. palmata.

Potentilla—*cont.*
rupestris, L., Eur.
schrenkiana, Regel.
semi-argentea, Hort. ×.
semi-laciniata, Hort. ×.
Sibbaldia, Haller fil., Himal.
Thurberi, Gray, N. Amer.
Visianii, Panc., Eur.
wrangeliana, Fisch., Siberia.

Poterium canadense, B. & H., N. Amer.
Sanguisorba, L., Eur.

Prenanthes purpurea, L., Eur.

Primula clusiana, Tsch., Eur.
denticulata, Sm., Himal.
floribunda, Wall., Himal.
involucrata, Wall., Himal.
japonica, Gray, Japan.
obconica, Hance, China.
officinalis, L., Eur.
Poissoni, Franch., China.
rosea, Royle, Himal.
verticillata, Forsk., Arabia.

Prunella grandiflora, L.,Eur.Cauc.
var. laciniata, Hort.
— var. rubra, Hort.
vulgaris, L., Eur.

Psoralea macrostachya, DC., N. Amer.
physodes, Dougl., N. Amer.

Pyrrhopappus carolinianus, DC., Florida, Texas.

Ramondia pyrenaica, Rich., Pyrenees.

Ranunculus acris, L., Eur.
— var. Steveni.
arvensis, L., Eur.
Broteri, Freyn., Spain.
brutius, Tenore, Italy.
cassius, Boiss., Taurus.
caucasicus, M.B., Caucas.
chærophyllus, L., Eur., etc.
Cymbalaria, Pursh, N. Amer.
falcatus, L., Eur.
Flammula, L., Eur.
Lingua, L., Eur.
muricatus, L., Eur.
parviflorus, L., Eur.
repens, L., Eur.
trachycarpus, F. & M., Orient.

Raphanus sativus, L., Eur.

Rapistrum linnæanum, All., Eur.

Reseda alba, L., S. Eur.
glauca, L., Pyren.
lutea, L., Eur.
Luteola, L., Eur.
Phyteuma, L., Eur.

Rhagadiolus stellatus, Gærtn., S. Eur.

Rheum collinianum, Baillon.
Emodi, Wall., Himal.
macropterum, Mart.
nobile, Hook. f., Sikkim.
officinale, Baill., Thibet.
palmatum, L., Ind., etc.
— var. tanghuticum.
Rhaponticum, L., Siber.
rugosum, Desf., Ind. Or.
Tranzenbachii, Hort. Berlin.
undulatum, L., Siberia, etc.
webbianum, Royle., India.

Ricinus communis, L., Eur.,Amer., etc.

Richardsonia scabra, D., Brazil.

Romanzoffia sitchensis, Chmss., Sitcha.

Rudbeckia amplexicaule, Vahl, N. Amer.
californica, Gray, Calif.
columnaris, Pursh, var. pulcherrima, Don, N. Amer.
hirta, L., N. Amer.
laciniata, L., N. Amer.
occidentalis, Nutt., N. Amer.
purpurea, L., N. Amer.
speciosa, Wendl., N. Amer.

Rumex abyssinicus, Jacq., Abyss.
alpinus, L., Eur.
Brownii, Campd., Austral.
nepalensis, Spr., Himal.
obtusifolius, L., Eur.
— var. sylvestris, (Wallr.).
Patientia, L., S. Eur.
pulcher, L., Eur.
purpureus, Poir., Eur.
salicifolius, Weinm., N. Amer.

Ruta graveolens, L., Eur.

Sagina glabra, Willd., S. Eur.
— var. pilifera.

Salvia æthiopis, L., Eur.
argentea, L., Medit.
Beckeri, Trautv., Caucas.
clandestina, L., Eur.
coccinea, L., Mexico.
glutinosa, L., Eur.
grandiflora, Ettl., Taur.
Horminum, L., S. Eur.
— var. bracteis violaceis.
hians, Royle, Ind.
interrupta, Schousb., Marocco.
napifolia, Jacq., S. Eur.
nutans, L., Transyl.
officinalis, L., Eur.
pratensis, L., Eur.
— var. alba.
— var. Baumgarteni, Grsb., Transs.
— var. rosea.
Sclarea, L., S. Eur.
sylvestris, L., var. alba., Eur.
tiliæfolia, Vahl, Mexico.
Verbenaca, L., Eur.
— var. disermas, Sibth. & Sm.
verticillata, L., Eur.
virgata, Ait., Eur.
viscosa, Jacq., Eur.

Sanvitalia procumbens, Lam., Mexico.

Saponaria calabrica, Guss., Eur.
ocymoides, L., Eur.
orientalis, L., Orient.

Satureja hortensis, L., Taur., Caucas.
montana, L., S. Eur.

Saxifraga altissima, Kerner, Eur.
aphylla, Sternb., Eur.
— var. leptophylla.
Aizoon, L., Eur.
— var. Churchillii, Kern.
— var. Gaudinii.
— var. incrustata.
— var. infracta.
— var. Malyi.
— var. minor.
— var. pectinata, Schott.
— var. pygmæa.
— var. recta, (Lap.)
— var. rotata.
— var. rosularis, Schleich.
cæspitosa, L., Eur., etc.
— var. decipiens, (Ehrh.).
— var. hirta, (Don).

Saxifragra—*cont.*
cæspitosa, var. sedoides, (L.)
cartilaginea, Willd., Caucas.
cochlearis, Rchb., Eur.
Cotyledon, L., Eur., Alps.
— var. pyramidalis, (Lap.).
crustata, Vent., Alps.
diversifolia, Wall., Nepal.
granulata, L., Eur.
Hostii, Tausch, Alps.
— var. macnabiana, Hort.
hypnoides, L., Eur.
kolenatiana, Regel, Siberia.
lactea, Turcz., Temp. Asia.
lingulata, Bell., Marit. Alps.
— var. lantoscana, (Boiss.).
longifolia, Lap., Pyrenees.
muscoides, Wulf., Eur.
— var. pygmæa, (Haw.).
Prostii, Sternb., Eur.
rocheliana, Sternb., Bosnia.
— var. coriophylla, (Griseb.).
rotundifolia, L., Eur.
— var. hirsuta.
sponhemica, Gm., var. hirta, Don, Eur.
tenella, Wulf., Alps.
tricuspidata, Rottb., Eur.
umbrosa, L., Eur.
valdensis, DC., Alps.

Scabiosa atropurpurea, L., Eur.
Columbaria, L., Eur.
graminifolia, L., Eur.
gramuntia, L., Eur.
integrifolia, Wulf., Eur.
isetensis, L., Eur.
lancifolia, Lernat., Alger.
lucida, Vill., Eur.
micrantha, Dsf., Maced.
palæstina, L., Syria, etc.
Portæ, Huter, Eur.
prolifera, L., Eur.
pterocephala, L., Greece.
stellata, L., Eur.
ucranica, L., Eur.
vestina, Facch., Tyrol.

Scandix Balansæ, Reut., Orient.
brachycarpa, Guss., Sicily.
macroryncha, C. A. Mey., Eur.
Pecten-Veneris, L., Eur.

Schismus marginatus, Beauv., S. Eur.

Schizanthus pinnatus, R. & P., Chili.

Schizopetalum Walkeri, Sims, Chili.

Scilla bifolia, L., Eur.
campanulata, Ait., Spain.
— var. alba, Hort.
— var. rubra.
chinensis, Benth., China.
lingulata, Poir., Eur.
nonscripta, Hoffm., Eur.
verna, Huds., W. Eur.

Scirpus setaceus, L., Eur.

Scleranthus annuus, L., Eur.
perennis, L., Eur.

Scolymus maculatus, L., Eur.

Scorpiurus vermiculata, L.,Eur.

Scorzonera laciniata, L., Eur.

Scrophularia aquatica, L., Eur.
Ehrhartii, Stev., Europe.
nodosa, L., Eur.
sylvatica, Boiss., Greece.
vernalis, L., Eur.

Scopolia lurida, Dub., Himal.

Scutellaria albida, L., S. Eur. Or.
alpina, L., Eur.
altissima, L., Caucas.
galericulata, L., Eur.
macrantha, Fisch., Siberia.

Secale Cereale, L., Asia Minor.
— var. villosum.

Sedum Aizoon, L., Siberia.
album, L., Eur.
cœruleum, Vahl, Corsica.
Ewersii, Ledeb., Siber.
glaucum, W. & K., Eur.
hybridum, L., Siber.
magellense, Ten., Italy.
maximum, Sut., Eur.
— var. atropurpureum.
middendorfianum, Maxim, Siberia.
Rhodiola, DC., Siber.
stellatum, L., Eur.
villosum, L., Eur.

Selinum Candollei, DC., Nepal.

Sempervivum boutignyanum, Bill., Pyrenees.
fimbriatum, Lehm., Tyrol.
mettenianum, Lehm., Switz.
montanum, L., Alps.

Senecio adonidifolius, Loisel., Eur.
ægyptius, L., Egypt.
Clusii, Schultz., Eur.
Doria, L., Eur.
Doronicum, L., Eur.
elegans, L., Cape.
— var. alba.
— var. purpurea.
Fuchsii, Gmel., Eur.
Hualtata, Bert., Chili.
japonicus, Sch., Japan.
macrophyllus, Bbrst., Caucas.
thyrsoideus, DC., Siberia.
vernalis, W. & K., Eur.
viscosus, L., Eur.

Serratula coronata, L., Siberia.
— var. macrophylla.
Gmelinii, Ledeb., Caucas.
quinquefolia, Bbrst., Caucas.
tinctoria, L., Eur.

Seseli gummiferum, Sm., Greece.
osseum, Crantz, Eur.
tortuosum, L., S. Eur.

Setaria glauca, Beauv., Eur.
italica, Beauv., Eur.
macrochæta, Link, Eur., Asia, etc.
verticillata, Beauv., Eur., &c.
viridis, Beauv., Eur., &c.

Sherardia arvensis, L., Eur.

Sibthorpia peregrina, L., N. Afr.

Sicyos Baderoa, Hk. & Arn., Chili.

Sidalcea candida, Gray, N. Amer.

Sideritis scordioides, L., Eur.

Silene alpestris, Jacq., Alps.
Armeria, L., Eur.
chloræfolia, Sm., var. swertifolia, Armenia.
Chouleti, Coss., Eur.
ciliata, Pourr., Crete.
clandestina, Jacq., Cape.
colorata, Poir., Mediter.
conoidea, L., Levant, etc.
cretica, L., Eur.
Cucubalus, Wibel, Eur.
diurniflora, Kunze, Cape.
echinata, Otth., Italy.
fimbriata, Sims, Crete, etc.
Fortunei, Vis., China.
fusca, Link, Portugal.
gallica, L., Eur.

Silene—*cont.*
glauca, Pourr., Eur.
gracilis, DC.
italica, Pers., Eur.
juvenalis, Del., Egypt.
linicola, Gmel., Germany.
longicilia, Otth., Portugal.
maritima, With., Eur.
nocturna, L., Eur.
nutans, L., Eur.
obtusifolia, Willd., Italy.
paradoxa, L., S. Eur.
pendula, L., Sicily, etc.
pseudo-atocion, Desf., N. Afr.
quadrifida, L., Eur.
rubella, L., Eur., N. Afr.
Sartori, Boiss., Greece.
Saxifraga, L., Eur.
Schafta, Gmel., Caucas.
sedoides, Jacq., Europe.
stylosa, Bunge, Siber.
tatarica, Pers., Tatar.
tenuifolia, Otth., Siber.
vallesia, L. Eur.
vesiculifera, Gay, S. Eur.
vespertina, Retz, S. Eur.
Zawadskii, Herbich, Austria.

Silphium perfoliatum, L., N. Amer.
scaberrimum, Ell., N. Amer.
trifoliatum, L., N. Amer.

Silybum eburneum, Coss. & Dur., Eur.
marianum, Gærtner, Eur.

Sisymbrium Alliaria, Scop., Eur.
assoanum, Losc, Eur.
austriacum, Jacq., S. Eur.
erysimoides, Dsf., Eur.
hispanicum, Jacq., Eur.
myriophyllum, H. B. K., Quito.
officinale, Scop., S. Eur.
polyceratium, L., Eur.
Sophia, L., Eur.
strictissimum, L., Eur.

Sisyrinchium augustifolium, Mill., Eur., Amer.
bermudianum, L., Bermuda.
striatum, Smith, Mexico.

Sium angustifolium, L., Eur.
latifolium, L., Eur.

Smyrnium Olusatrum, L., Eur.

Soja hispida, Mœnch, Ind. Or.

Solanum Dulcamara, L., Eur.
guineense, Lam., Trop. Afr.
villosum, Lam., Eur.

Solidago canadensis, L., N. Amer.

Sonchus oleraceus, L., Eur.
palustris, L., Eur.

Sorghum vulgare, P. & S., Orient.

Sparganium simplex, Huds., Eur.

Specularia falcata, A.DC., Mediter.
— var. castellana, Lange.
pentagonia, A.DC., Orient.
perfoliata, DC., N. Amer.
Speculum, A.DC., Eur.

Spergula arvensis, L., Eur.

Spilanthes oleracea, L., Ind. Or.

Spiræa astilboides, Hort.
Aruncus, L., N. Amer.
decumbens, Koch, Eur.
digitata, Willd., Siberia.
palmata, Thunb., Japan.
Ulmaria, L., Eur.

Stachys alpina, L., Eur.
— var. intermedia.
arvensis, L., Eur.
Betonica, Benth., Eur.
— var. alba.
grandiflora, Bth., Caucas, etc.
recta, L., Eur.
spinulosa, Sib. & Sm., Greece.
setifera, Mey., Caucas.
sylvatica, L., Eur.

Statice bellidifolia, Gouan., Eur.
densiflora, Guss., Eur.
Gmelinii, Willd., Eur.
gougetiana, Girard, Spain.
Limonium, L., Eur.
lychnidifolia, Gir., S. Eur.
Suworowii, Regel, Turkestan.
tatarica, L., Asia.
Thouini, Viv., S. Eur.
tomentella, Boiss., Eur., etc.

Stevia Eupatoria, Willd., Mexico.
ovata, Lagasc., Mexico.

Stipa Aristella, L., Eur.
pennata, L., Eur., etc.
sibirica, Lam., Siber.

Swertia perennis, L., Eur. Cauc.
punctata, Bmg., Transyl.

Symphyandra Hofmanni, Pantocs, Bosnia.
pendula, DC., Caucas.
Wanneri, Heuff., Eur.

Symphytum officinale, L., Eur.

Syrenia lamarckiana, Andrz., Siberia.

Tagetes lucida, Cav., Mexico.
patula, L., Mexico.
pusilla, H.B., Quito.

Tamus communis, L., Eur.

Taraxacum corniculatum, DC., Eur.
gymnanthum, DC., Eur.

Tellima grandiflora, R.Br., N. Amer.

Tetragonia crystallina, L'Herit., Peru.
expansa, Murr., Austral.

Tetragonolobus purpureus, Mœnch, S. Eur.

Teucrium Arduini, L., Eur.
Botrys, L., Eur.
canadense L., N. Amer.
Chamædrys, L., Eur.
— var. aurea.
hyrcanicum, L., Caucas.
multiflorum, L., Orient.
Scorodonia, L., Eur.
— var. variegatum.

Thalictrum angustifolium, Jacq., S. Eur.
— var. (T. nigricans, DC.), Eur.
aquilegifolium, L., Eur., etc.
— var. purpureum.
flavum, L., Eur.
— var. sphærocarpum, Lej.
glaucum, Desf., S. Eur.
minus, L., Eur.
— var. affine, (Jord.)
— var. concinnum.
— var. elatum, Regel.
— var. pubescens.
— var. purpurascens.
trigynum, Fisch., Siber.

Thelesperma filifolium, Gray, N. Amer.

Thermopsis lanceolata, R.Br., Siberia.
montana, Nutt., N. Amer.

Thlaspi alliaceum, L., Eur.
arvense, L., Eur.
alpestre, L., Eur.
perfoliatum, L., Eur.
præcox, Wulf., Austria.

Thrincia hirta, DC., Eur.

Thymus comosus, Heuff., Transs.
lanceolatus, Desf., N. Afr.
Serpyllum, L., Eur.

Tigridia Pavonia, Ker, Mexico.

Tofieldia calyculata, Whlnb., Eur.

Tovaria racemosa, Neck., N. Amer.
stellata, Neck., N. Amer.

Tournefortia heliotropioides, Hook., Buen. Ayres.

Trachymene pilosa, Sm., Austral.

Tradescantia erecta, Jacq., Mexico.

Tragopogon majus, Jacq., Eur.
orientale, L., Eur., etc.
pratense, L., Eur.

Tridax trilobata, Hemsl, Mexico.

Trifolium bifidum, Gray, var. decipiens, Calif.
glomeratum, L., Eur.
hybridum, L., Eur.
incarnatum, L., Eur.
Lagrangei, Boiss., Orient.
leucanthum, Bbrst., Taurus.
minus, Sm., Eur.
multistriatum, Koch, Eur.
pannonicum, L., Eur., etc.
Perreymondi, Gren., France.
pratense, L., Eur.
repens, L., Eur.
resupinatum, L., Eur.
rubens, L., Eur.
squarrosa L., S. Eur.
tomentosum, L., Eur.

Triglochin maritimum, L., Eur.
palustre, L., Eur.

Trigonella corniculata, L., S. Eur.
cœrulea, Ser., Eur.
cretica, Boiss., Crete.
fœnum-græcum, L., S. Eur.
ovalis, Boiss., Spain.
polycerata, L., Eur.

Trillium grandiflorum, Salisb., N. Amer.

Trinia Hoffmanni, Bbrst., Eur., etc.
Kitaibelii, Bbrst., Russia, etc.

Tripteris cheiranthifolia, Schultz, Abyss.

Trisetum flavescens, Beauv., Eur.

Triticum caninum, L., Eur.
desertorum, Fisch., Russia.
durum, Desf., S. Eur., N. Afr.
monococcum, L., Eur.
Requieni, Ces., S. Eur.
ventricosum, Tsch., S. Eur.
villosum, Beauv., Eur.
violaceum, Horn., Eur.

Tritonia crocosmaeflora, Garden Hybrid.
Pottsii, Benth., Cape.

Trollius asiaticus, L., Siber.
europæus, L., Eur.
— var. napellifolius.

Tropæolum aduncum, Sm., Peru.
majus, L., Peru.
minus, L., Peru.
tuberosum, R. & P., Peru.

Troximon glaucum, Nutt., N. Amer.
var. laciniatum, Gray.
grandiflorum, Gray, Calif.

Tunica illyrica, Boiss., Eur.
Saxifraga, Scop., Eur.

Urospermum Dalechampii, Desf., Eur.
picroides, Desf., S. Eur.

Ursinia pulchra, N. E. Brown, Cape.
— var. sulphurea, Hort. Kew.

Urtica dioica, L., Eur.
membranacea, Poir., Eur.
pilulifera, L., Eur.
— var. balearica, L.

Valeriana alliariæfolia, Vahl, Caucas.
— var. intermedia.
montana, L., Eur.
officinalis, L., Eur.
— var. exaltata, (Mikan).
— var. sambucifolia, (Mikan).
Phu, L., S. Eur.

Valerianella carinata, Loisl., S. Eur.
coronata, DC., Eur.
dentata, Poll., Eur.
echinata, DC., Eur.
eriocarpa, Desv., Eur.
olitoria, Poll., Eur.
vesicaria, Mch., Eur.

Venidium fugax, Harv., Cape.

Veratrum album, L., Eur.
nigrum, L., Eur.
viride, Ait., N. Amer.

Verbascum Blattaria, L., Eur.
Chaixii, Vill., Eur.
malacotrichum, B.H., S. Eur.
phlomoides, L., Eur.
phœniceum, L., Eur. Siber.
pyramidatum, Bbrst., Caucas.
sinuatum, L., Eur.
speciosum, Schrad., Eur.
thapsiforme, Schrad., Eur.

Verbena Aubletia, L., N. Amer.
bonariensis, L., S. Amer.
caroliniana, Med., N. Amer.
officinalis, L., Eur.
prostrata, R.Br., N. Amer.
venosa, Gill. & Hook., Buenos Ayres.

Vernonia altissima, Nutt., N. Amer.

Veronica agrestis, L., Eur.
aphylla, L., Eur.
austriaca, L., Eur.
— var. pinnatifida.
Bidwillii, Hook. f., N. Zeal.
exaltata, Maud., Siber.
gentianoides, Vahl., Taur.
incana, L., Russia.
incisa, Ait., Siber.
longifolia, L., Eur.
— var. alba.
— var. Hostii.
— var. mollis.
— var. rosea.
— var. subsessilis.
Lyallii, Hk. f., N. Zeal.
officinalis, L., Eur.
repens, Clar., Corsica.
saxatilis, L., Eur.
serpyllifolia, L., Eur.
spicata, L., Eur.
taurica, Willd., Taur.

Veronica—*cont.*
Teucrium, L., Eur.
— var. latifolia, (L.).
virginica, L., N. Amer.
— var. japonica, (Steud.).

Vesicaria cretica, Poir., Crete.
edentula, Poir., Eur.
grandiflora, Hook., Texas.

Vicia amphicarpa, Dorth., France.
atropurpurea, Desf., Eur.
calcarata, Desf., Algiers.
cassubica, L., S. Eur.
Cracca, L., Eur.
disperma, DC., Europe.
Ervilia, Willd., S. Eur.
Faba, L., cultivated.
— var. equina, (Pers.).
fulgens, Hort
macrocarpa, Bert., Eur.
pannonica, Cr., Eur.
pyrenaica, Pourr., Pyren.
sativa, L., Eur., etc.
— var. morisiana, (Jord.).
sepium, L., Eur.
sicula, Guss., Eur.
sitchensis, Bong., N. Amer.
sylvatica, L., Eur.
tetrasperma, Mœnch, Eur.
unijuga, A. Braun, Siberia.
varia, Host, Eur.
villosa, Roth, S. Eur.

Vincetoxicum fuscatum, Rch. f., Eur.
nigrum, Michx., Eur.
officinale, Mch., Eur.

Viola cornuta, L., Eur.
— var. alba.

Viola—*cont.*
elatior, Fr., Eur.
Jooi, Janka, Transylv.
lactea, Sm., Eur.
odorata, L., Eur.
palustris, L., Eur.
rothomagensis, Desf., Eur.
reichenbachiana, Bor., Eur.
striata, Ait., N. Amer.
sylvatica, L., Eur.
syrtica, Sund., Eur.
tricolor, L., Eur.

Wahlenbergia capensis, A.DC., Cape.
gracilis, A.DC., Austral.
graminifolia, A.DC., Dalm.
undulata, A.DC., Cape.

Wulfenia carinthiaca, Jacq., Carinth.

Xanthium indicum, Wall., Ind., etc.
strumarium, L., Eur.

Xanthocephalum gymnospermoides, B. & Hk. f., Arizona.

Xeranthemum annuum, L., Eur.

Zinnia elegans, Jacq., Mexico.
multiflora, L., Mexico.
pauciflora, L., N. Amer.
tenuiflora, Jacq., Mexico.

Ziziphora capitata, L., Taur., etc.
tenuior, L., S. Eur.

Zollikoferia elquinensis, Phil., Chili.

Zygadenus elegans, Pursh, N. Amer.

TREES AND SHRUBS.

Acer campestre, L., Europe.
— var. collinum, Wallr.
— var. hebecarpum, Hort.
circinatum, Pursh, N.W. Amer.
hyrcanum, F. & M., Caucasus.
insigne, Boiss. & Buhse, N. Persia.
macrophyllum, Pursh, W.N. Amer.
monspessulanum, L., Europe.
opulifolium, Vill., var. obtusatum, Europe.
platanoides, L., Europe.
— var. integrilobum.
— var. Schwedleri.
Pseudo-Platanus, L., Eur., etc.
— var. euchlorum.
— var. purpureum, Hort.

Ailantus glandulosus, Desf., Japan.

Alnus cordifolia, Ten., Italy.
firma, S. & Z., Japan.
glutinosa, Gærtn., Eur.
— var. rubronervia, Hort.
— var. sorbifolia, Hort.
incana, Willd., N. Hemisphere.
— var. laciniata, Hort.
orientalis, Dcne., Orient.
serrulata, Willd., N. Am.
— var. latifolia, Hort.

Amelanchier canadensis, Torr. & Gr., N. Amer.

Amorpha fruticosa, L., N. Amer.

Aucuba japonica, Thunb., Japan.
vera, Hort.

Azalea rhombica, Regel, Japan.
hybrids.

Berberis aristata, DC., Himalaya.
buxifolia, Lamk., Chili.
Darwinii, Hook., Chili.
stenophylla, Hort.
virescens, Hook. f., Himalaya.
vulgaris, L., Eur., etc.
wallichiana, DC., Himal.

Betula alba, L., N. Hemisph.
— var. costata.
— var. tristis.
— var. Youngii, Hort.
lutea, Michx. f., N. Amer.
Maximowiczii, Regel, Japan.
papyracea, Ait., N. Amer.

Bruckenthalia spiculifolia, Reichb., Europe.

Buddleia japonica, Hemsl., Japan.

Biota orientalis, End., Orient.

Caragana arborescens, Lam., Siberia.
frutescens, DC., Siberia.
— var. grandiflora.
pygmæa, DC., Siberia.
Redowskii, DC., Siberia.

Carpinus Betulus, L., Eur., etc.
— var. incisa.
orientalis, Mill., S. Europe.

Celastrus articulatus, Thunb., Japan, etc.

Celtis occidentalis, L., N. Amer.

Cistus laurifolius, L., Spain.
platysepalus, Sweet., Crete.

Cladrastis amurensis, Benth. & Hook., Amur.

Clematis erecta, L., Europe, etc.
Flammula, L., S. Eur.
ligusticifolia, Nutt., N. Amer.

Clethra canescens, Reinw., Japan, etc.

Colutea arborescens, L., Eur.
cruenta, Ait., Orient.
istria, Mill., Asia Minor.

Cornus alba, L., N. Amer.
alternifolia, L. f., N. Amer.
paniculata, L'Herit., N. Amer.
sanguinea, L., Eur.
sericea, L., N. Amer.

Cotoneaster bacillaris, Wall., Himal.
— var. floribunda, Hort.
— var. obtusa, Hort.
buxifolia, Wall., Himal.
frigida, Wall., Himal.
horizontalis, Dcne., Himal.
integerrima, Med., Europe.
microphylla, Wall., Himal.
Nummularia, F. & M., Europe, Asia.
rotundifolia, Wall., Himal.
Simonsii, Baker., Himal.
tomentosa, Lindl., Eur.
uniflora, Bunge, Siberia, etc.

Cratægus Carrierei, Vauvel. (C. Lavallei, Herincq.)
chlorosarca, Maxim., Mandshuria.
coccinea, L., N. Amer.
— var. acerifolia, Hort.
— var. glandulosa, Hort.
— var. indentata, Hort.
cordata, Mill., N. Amer.
Crus-Galli, L., N. Amer.
— var. arbutifolia, Hort.
— var. ovalifolia, Lindl.
— var. pruinosa, Hort.
— var. splendens, Lodd.
Douglasii, Lindl., West, N. Amer.
flava, Ait., N. Amer.
heterophylla, Flugge, Orient.
melanocarpa, Bieb., Caucasus.
mollis, Scheele, United States.
monogyna, Jacq., Europe.
orientalis, Pall., Orient.
Oxyacantha, L., Eur.
— var. fusca, Hort.
parvifolia, Ait., N. Amer.
punctata, Jacq., N. Amer.
— var. brevispina, Hort.
— var. striata, Hort.
Pyracantha, Pers., var. Lalandii, Hort.
rivularis, Nutt., West. N. Amer.
sinaica, Boiss., Orient.
tanacetifolia, Pers., Orient.
tomentosa, L., N. Amer.

Cupressus lawsoniana, Murr., Calif.
nootkatensis Lamb., N.W. Amer.
Thyoides, L., N. Amer.

Cytisus albus, L., S.W. Eur.
— var. incarnatus, Hort.
biflorus, L'Herit., Eur.
monspessulanus, L., S. Eur.
nigricans, L., Eur.
— var. longispicatus, Hort.
× præcox, Hort.
purpureus, Scop., E. Eur.
scoparius, L., Eur.
— var. Andreanus.
— var. pendula, Hort.
sessilifolius, L., Eur.

Dabœcia polifolia, D. Don, W. Eur.

Daphne Mezereum, L., Europe.
— var. flore albo.

Daphniphyllum macropodium, Miq., Japan.

Deutzia crenata, S. & Z., Japan.
— var. Sieboldii, Hort.
scabra, Thunb., Japan.

Ehretia elliptica, DC., Texas, etc.

Elæagnus longipes, A. Gray, Japan.
umbellata, Thunb., Japan.

Erica stricta, Andr., S. Eur.

Euonymus europæus, L., Eur.
— var. coccineus, Hort.
latifolius, Scop., Eur.

Forsythia suspensa, Vahl, Japan.

Fraxinus mandschurica, Rupr., Mandschuria.
oregona, Nutt., N. Amer.
Ornus, L., Europe.
xanthoxyloides, Wall., Himalaya.

Gaultheria Shallon, Pursh, N. Amer.
procumbens, L., N. Amer.

Genista æthnensis, DC., Sicily.
pilosa, L., Europe.
radiata, Scop., S. Eur.
sagittalis, L., Eur.
tinctoria, L., var. elatior, Europe.
virgata, DC., Madeira.

Halesia tetraptera, L., N. Amer.

Hamamelis virginica, L., N. Amer.

Hedera Helix, L., Eur., etc.

Hippophae rhamnoides, L., Eur., etc.

Hovenia dulcis, Thunb., China, etc.

Hypericum Androsæmum, L., Eur.
calycinum, L., Orient.
elatum, Ait., N. Amer.

Ilex Aquifolium, L., Eur.
— var. platyphylla, Hort.
lævigata, Gray, E. United States.
verticillata, Gray, N. Amer.

Kalmia angustifolia, L., N. Amer.
glauca, Ait., N. Amer.
latifolia, L., N. Amer.

Laburnum Alschingeri, Vis., E. Eur.
vulgare, Griseb., Eur.
— var. Carlieri, Hort.
— var. involutum, Hort.
— var. quercifolium.

Ledum latifolium, Ait., N. Amer.

Leucothöe Davisiae, Torr., California.

Leycesteria formosa, Wall., Himal.

Ligustrum Ibota, Sieb., Japan.
vulgare, L., Europe.

Lonicera glauca, Hill, N. Amer.
Morrowii, Gray, Japan.
orientalis, Lam., Asia Minor.
segreziensis, Hort.
Xylosteum, L., Eur.

Lyonia ligustrina, DC., N. Amer.

Mahonia Aquifolium, Nutt., N. Amer.
— var. murrayana, Hort.
fascicularis, DC., N. Amer.

Mespilus Smithii, DC., Caucasus.

Morus nigra, L., Eur.

Myrica cerifera, L., United States.

Neillia amurensis (Benth. & Hook., Amurland.
opulifolia, Benth. & Hook., N. Amer.

Olearia Haastii, Hook. fil., N. Zeal.

Oxydendrum arboreum, DC., N, Amer.

Paulownia imperialis, S. & Z., Japan.

Pernettya mucronata, Gaud., Chili, etc.

Petteria ramentacea, Presl, Europe.

Phellodendron amurense, Rupr., Amurland.

Philadelphus hirsutus, Nutt., Oregon.

Picea Glehnii, F. Schmidt, Japan.

Pieris mariana, Bnth., & Hook. f., N. Amer.

Pinus parviflora, S. & Z., Japan.

Piptanthus nepalensis, Sweet, Himalaya.

Potentilla fruticosa, L., North Hemisphere.

Prunus Avium, L., Europe, etc.
Brigantiaca, Chaix, S.E. France.
humilis, Bunge, China.
lusitanica, L. f., Portugal.
maritima, Wangenh., N. Amer.
Maximowiczii, Rupr., Mandshuria.
Persica, Stokes, China, etc.
— var. foliis rubris.

Ptelea trifoliata, L., N. Amer.

Pyrus americana, DC., N. Amer.
Aria, Ehrh., Europe, etc.
— var. angustifolia.
— var. cretica, Hort.
— var. græca, Boiss.
— var. lutescens, Hort.
— var. salicifolia.
arbutifolia, L., N. Amer.
Aucuparia, Gærtn., Eur.
baccata, L., Asia.
— var. coccinea.
— var. microcarpa.

Pyrus—*cont.*
decaisneana, Nichols., Origin unknown.
domestica, Sm., var. maliformis.
floribunda, Sieb., Japan.
intermedia, Ehrh., Europe.
japonica, Thunb., Japan.
latifolia, Syme, Eur.
Maulei, Masters, Japan.
— var. superba, Hort.
nigra, Sargent, N. Amer.
pinnatifida, Ehrh., Eur.
prunifolia, Willd., Siberia, etc.
Ringo, Max., Japan, etc.
sikkimensis, Hook. f., Sikkim.
spuria, DC., Hybrid origin.
vestita, Wall., Himalaya.

Rhamnus Alaternus, L., S. Europe.
— var. angustifolius.
carolinianus, Walt., S. U. States.
catharticus, L., Europe, etc.
davuricus, Pall., Asia.
Frangula, L., Europe.
— var. angustifolius.
infectorius, L., S. Europe.

Rhododendron dauricum, L., Siberia.

Rhodotypus kerrioides, S. & Z., Japan.

Rhus Cotinus, L., Europe.
glabra, L., N. Amer.
radicans, L., N. Amer.
succedanea, L., China & Japan.

Ribes alpinum, L., Eur.
cereum, Dougl., West. N. Amer.
sanguineum, Pursh, N.W. Amer.
— var. atrosanguineum, Hort.
— var. glutinosum, Benth.
valdivianum, Phil., Chili.

Rosa alpina, L., Eur., var. inermis.
arkansana, Porter, N. Amer.
Bakeri, Déségl., England.
blanda, Ait., N. Amer.
canina, L., Eur., etc.
— var. andegavensis, Baker.
carolina, L., N. Amer.
cinnamomea, L., Eur., etc.
fulgens, Christ, Switzerland.

Rosa—*cont.*
hibernica, Sm., Britain.
lucida, Ehrh., N. Amer.
microphylla, Roxb., China.
moschata, Mill., India, etc.
multiflora, Thunb., Japan.
nitida, Willd., N. Amer.
nutkana, Presl, N. Amer.
omissa, Déségl., Eur.
pisocarpa, A. Gray, West. N. Amer.
pomifera, Herrm., Europe.
rubiginosa, L., Europe, etc.
— var. major, Hort.
rubrifolia, Vill., Eur.
rugosa, S. & Z., Japan.
— var. alba.
sericea, Lindl., Himal.
spinosissima, L., Eur.
— var. altaica.
Wilsoni, Bor., Britain.

Rubus balfourianus, Blox., Europe.
biflorus, Buchan, Himalaya.
caesius, L., Europe.
calvatus, Blox., Europe.
Colemani, Blox., Europe.
dumetorum, W. & N., var. ferox.
echinatus, Lindl., Britain.
laciniatus, Willd., Hort.
leucostachys, Sm., Europe.
lindleyanus, Lees, Britain.
macrophyllus, W. & N., Europe.
mucronatus, Borr., Britain.
occidentalis, L. & N., Amer.
pubescens, Auct. Angl., Britain.
rhamnifolius, W. & N., Europe.
sorbifolius, Maxim., China.
suberectus, Anders., Europe.
villicaulis, W. & N., Europe.

Sambucus glauca, Nutt., West. N. Amer.
nigra, L., Eur., etc.
— var. leucocarpa.
— var. swindonensis, Hort.
— var. virescens, Hort.
racemosa, L., North Hemisphere.

Skimmia Fortunei, Mast. (S. japonica, Hort.), China.

Spartium junceum, L., S. Eur.

Spiræa carpinifolia, Pall., Eur.
  Douglasii, Hook., N.W. Amer.
  japonica, L. fil., Japan.
  — var. Bumalda.
  — var. glabra, Hort.
  — var. glabrata, Nichols.
  — var. typica.
  lindleyana, Wall., Himal.
  paniculata, L.
  salicifolia, L., N. Amer.
  — var. lancifolia.
  sanssouciana, Hort.
  sorbifolia, L., N. Asia.
  splendens, Hort.
  tomentosa, L., N. Amer.

Staphylea pinnata, L., Europe.

Symphoricarpus racemosus, Michx. N. Amer.

Syringa pekinensis, Rupr., China.

Taxus baccata, L., Eur., etc.
  — var. adpressa.
  — var. Dovastonii, Hort.
  — var. fastigiata.
  — var. fructu-luteo, Hort.
  — var. sinensis.

Taxus—*cont.*
  — var. Washingtoni, Hort.
  cuspidata, S. & Z., Japan.

Ulex europæus, L., Eur.

Vaccinium maderense, Link., Azores.
  stamineum, L., N. Amer.

Viburnum dentatum, L., N. Amer.
  dilatatum, Thunb., Japan.
  Lantana, L., Eur.
  molle, Michx., N. Amer.
  Opulus, L., Eur., etc.

Vitis heterophylla, Thunb., Japan.
  — var. humulifolia.
  Labrusca, L., N. Amer.
  riparia, Michx., N. Amer.

Yucca Whipplei, Torr., California.

Zelkowa Keaki, Sieb., Japan.

Zenobia speciosa, D. Don, U. S. Amer.
  — var. pulverulenta.

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX II.—1895.

NEW GARDEN PLANTS OF THE YEAR 1894.

The number of garden plants annually described in botanical and horticultural publications, both English and foreign, is now so considerable that it has been thought desirable to publish a complete list of them in the *Kew Bulletin* each year. The following list comprises all the new introductions recorded during 1894. These lists are indispensable to the maintenance of a correct nomenclature, especially in the smaller botanical establishments in correspondence with Kew, which are, as a rule, only scantily provided with horticultural periodicals. Such a list will also afford information respecting new plants under cultivation at this establishment, many of which will be distributed from it in the regular course of exchange with other botanic gardens.

The present list includes not only plants brought into cultivation for the first time during 1894, but the most noteworthy of those which have been re-introduced after being lost from cultivation. Other plants included in the list may have been in gardens for several years, but either were not described or their names had not been authenticated until recently.

In addition to species and botanical varieties, all hybrids, whether introduced or of garden origin, but described for the first time in 1894, are included. It has not been thought desirable, however, to give authorities after the names of garden hybrids in such genera as *Cypripedium*, &c. Mere garden varieties of such plants as *Coleus, Codiæum* or *Narcissus* are omitted for obvious reasons.

In every case the plant is cited under its published name, although some of the names are doubtfully correct. Where, however, a correction has appeared desirable this is made.

The name of the person in whose collection the plant was first noticed or described is given where known.

An asterisk is prefixed to all those plants of which examples are in cultivation at Kew.

The publications from which this list is compiled, with the abbreviation used to indicate them, are as follows:— *B. M.*— Botanical Magazine. *B. T. O.*—Bulletino della R. Società Toscana di Orticultura. *Bull Cat.* — Bull, Catalogue of New, Beautiful, and Rare Plants. *Gard.*—The Garden. *G. C.* — Gardeners' Chronicle. *G. and F.*—

Garden and Forest. *Gfl.*—Gartenflora. *G. M.*—Gardeners' Magazine. *Ill. H.*—L'Illustration Horticole. *Jard.*—Le Jardin. *J. of H.*—Journal of Horticulture. *J. O.*—Journal des Orchidées. *K. B.*—Bulletin of Miscellaneous Information, Royal Gardens, Kew. *L.*—Lindenia. *M. G. Z.*—Möller's Deutsche Gärtner-Zeitung. *O. R.*—Orchid Review. *R.*—Reichenbachia. *R. H.*—Revue Horticole. *R. H. B.*—Revue de l'Horticulture Belge. *Spaeth Cat.*—L. Spaeth, General Nursery Catalogue. *Veitch Cat.*—Veitch & Sons, Catalogue of Plants. *W. G.*—Wiener Illustrirte Garten-Zeitung. *Williams Cat.*—Williams, New and General Plant Catalogue. *W. O A.*—Warner & Williams, Orchid Album.

The abbreviations in the descriptions of the plants are:—*ft.*—Foot or Feet. *G.*—Greenhouse.—*H.* Hardy. *H. H.*—Half-hardy. *in.*—Inches. *S.*—Stove.

Acacia baileyana, F. von Muell. (*G. C.* 1894, xv., 37, fig. 4.) Leguminosæ. G. A shrub with elegant bipinnate leaves and small globose heads of yellow flowers in loose unbranched racemes. Australia. (Cambridge Botanic Garden.)

Acer Miyabei, Maxim. (*Spaeth Cat.* 1894–5.) Sapindaceæ. H. This species was figured in "*Garden and Forest,*" 1893, 143. A fine ornamental tree nearly related to the Norway Maple, *Acer platanoides*. Japan. (Spaeth, Berlin.)

Adiantum Claesii, Lind. & Rod. (*Ill. H.* 1894, 137, t. 9; *G. C.* 1894, xv., 663.) Filices. S. A species with large obcordate-lanceolate pinnules variegated with white and light green on dark green ground. Brazil. L'Horticulture Internationale.)

***Æschynanthus Hildebrandii,** Hemsl. (*B. M.* t. 7365.) Gesneriaceæ. G. A well marked species, the stems being short, the leaves less than an inch long, ovate, thick, fleshy, and the flowers—in erect clusters on the ends of the stems—an inch long, orange scarlet, the segments margined with deep red. Burma. (Kew.)

***Æschynanthus obconica,** C.B.Clarke. (*B. M.* t. 7336.) S. A near ally of *Æ. tricolor*, but with a broad campanulate calyx and short corolla-tube. It has slender stems, ovate leaves, and two-flowered axillary racemes; calyx an inch wide, crimson, corolla scarlet with yellow stripes on the spreading lobes. Malaya. (J. Veitch & Sons.)

Æsculus plantierensis, Hort. (*R. H.* 1894, 246.) Sapindaceæ. H. A garden hybrid between *Æ. Hippocastanum* and *Æ. rubicunda*. (Simon-Louis frères, Metz.)

***Aglaonema pumilum,** Hook, f. (*Veitch Cat.* 1894, 5, fig.) Aroideæ. S. A dwarf plant with ovate acuminate leaves 5 in. long coloured deep sea-green marbled and blotched with white. Malaya. (J. Veitch and Sons.)

Allium Akaka, Gmelin. (*B. T. O.* 1894, 226.) Liliaceæ. H. A dwarf-growing species, with rose-coloured flowers produced in spring. A near ally of *A. karataviense*, Regel. (Dammann & Co., Naples.)

***Alocasia Curtisii,** N. E. Br. (*K. B.* 1894, 347.) Aroideæ. S. A new species allied to *A. decipiens*. Leaf-stalk about 2 ft. long; blade 18 in. long, 12 in. broad, with long basal lobes, light and dark green above, purple beneath; peduncle a foot long; spathe 6 in. long, pale yellow; spadix 6 in. long, yellow. Penang. (Kew.)

***Alocasia sanderiana,** Hort. (*Bull. Cat.* 1894, 8, fig.) S. A large leaved species, the blades deeply lobed on both sides, glossy dark green, with the midrib and principal nerves margined with white; leaf stalk mottled. Malaya. (W. Bull.)

Aloe Derbetzi, Hort. (*R. H.* 1894, 147.) Liliaceæ. G. A garden hybrid between *Gasteria acinacifolia* and *Aloe rubro-cincta*. (Deleuil, Marseilles.)

***Aloe Kirkii,** Baker. (*B. M.* t. 7386.) S. A new species allied to *A. brevifolia*. Stem short; leaves dark green, 30–40 in a dense rosette, each nearly a foot long, 2 in. wide, with large marginal teeth; spike 2 ft. long, branched; flowers over an inch long, red-yellow, tipped with brown. Zanzibar. (Kew.)

***Aloe Luntii,** Baker. (*K. B.* 1894, 342.) S. A new species, with a short stem, distichous leaves, which are lanceolate, thick, unarmed, recurved and green; flowers about an inch long, reddish-green, borne on a loose panicle. South Arabia. (Kew.)

Aloe striata, Haw. var. **oligospeila**, Baker. (*G. C.* 1894, xv., 588.) S. Differs from the type by its more erect habit, taller stem, and narrower leaves, with a broad white border. British Kaffraria. (T. Cooper.)

Alsophila marshalliana, L. Linden. (*G. C.* 1894, xv., 663.) Filices. S. "A plant of dwarf habit, with dark shining fronds, the pinnæ being very crisp and gracefully waved." ? Brazil. (L'Horticulture Internationale.)

***Amorphophallus Elliotii**, Hook, f. (*B. M.* t. 7349.) Aroideæ. S. A new species and the type of a new section, viz., *Podophallus*. Tuber fleshy, leaf 1 ft. high, blade trisect pinnatifid; scape 1 ft., bearing a short, broad-hooded spathe with a small aperture; colour pink and green with blotches and zones of brown-purple; spadix shorter than the spathe, purple. Sierra Leone. (Kew.)

Anemone Eunrenia, Hort (*B. T. O.* 1894, 226.) Ranunculaceæ. H. Probably a form of *A. coronaria* or *A. hortensis*. Persia. (Dammann & Co., Naples.)

Angræum fournierianum, Kränzlin. (*G. C.* 1894, xv., 808; xvi., 43, fig. 7.) Orchideæ. S. A new species allied to *A. eichlerianum*, but the flowers are larger, being 2 in. wide, and of a purer white; the apex of the labellum is prolonged into an acute tongue. Madagascar. (F. Sander & Co.)

Anguloa madouxiana, L. Lind. (*L.* t. 434; *J. O.* v., 124.) Orchideæ. G. A garden hybrid supposed to be between *A. Ruckeri* and *A. uniflora*. (L'Horticulture Internationale.)

Anthemis macedonica, *Boiss. & Orph.* (Gard. 1894, xlv., 519.) Compositæ. H. A rock plant 6–8 in. high, with white daisy-like flowers, having a dark yellow centre. Macedonia. (R. Veitch, Exeter.)

Antholyza Schweinfurthii, Baker. (*G. C.* 1894, xv., 588.) Irideæ. G. A new species allied to *A. abyssinica*, but smaller in all its parts. Flowers bright red and yellow, on simple loose spikes. Abyssinia. (Dammann & Co., Naples.)

Anthurium crombezianum, (*R. H.* 1894, 552, t.) Aroideæ. S. A garden hybrid of which *A. scherzerianum* is one of the parents. (Madame Crombez, Cannes.)

Anthurium Prince Léos Radziwill. (*R. H.* 1894, 11, t. 1.) S. A garden hybrid of which *A. andréanum* is one of the parents. (Vandendael, Monte Carlo.)

Anthurium Princess Lise Radziwill. (*R. H.* 1894, 11, t. 2.) S. A garden hybrid of which *A. andréanum* is one of the parents. (Vandendael, Monte Carlo.)

Aphelandra dubia, Lind. & Rod. (*Ill. H.* 1894, 233, t. 15.) Acanthaceæ. S. A garden hybrid between *Aphelandra nitens* var. *Sinitzini* and *Stenandrium Lindeni*. (L'Horticulture Internationale.)

***Apodolirion Ettæ**, Baker. (*G. and F.* 1894, 424.) Amaryllideæ. G. An ally of Cooperia, having tunicated bulbs and leaves and flowers like those of Crocus, coloured white and rose. S. Africa. (Kew.)

***Arenaria Huteri**, *Kerner*. (*J. of H.* 1894, xxix., 369, fig. 57.) Caryophyllaceæ. H. A pretty plant, of neat habit, with large pure white flowers. Tyrol. (Sünderman, Lindau im Bodensee, Bavaria.)

***Artemisia tridentata**, Nutt. (*Spaeth Cat.* 1894–5.) Compositæ. H. A thick-growing bush with silvery persistent leaves. Western North America. (Spaeth, Berlin.)

Arum Magdalenae, Sprenger. (*B. T. O.* 1894, 227.) Aroideæ. H. Nearly allied to *A. palaestinum*, but with a yellow spathe, marbled and spotted with purple. Palestine. (Dammann & Co., Naples.)

Arum modicense, Sprenger. (*B. T. O.* 1894, 227.) H. A vigorous form of *A. italicum*. Sicily. (Dammann & Co., Naples.)

***Arundinaria Hindsii**, Munro. (*G. C.* 1894, xv., 238.) Bambuseæ. A hardy bamboo with stems 6 ft. high; leaves 8 in. by ½ in., semi-erect, dark green. Syn. *Bambusa erecta*; "Kanzan Chiku." Japan. (Kew.)

***Arundinaria Hindsii**, Munro, var. **graminea** (*Bambusa graminea*, Hort.) (*G. C.* 1894, xv., 238.) Has shorter stems and narrower leaves than the type. Japan. (Kew.)

***Arundinaria khasyana**, Munro. (*G. C.* 1894, xv., 301.) H. The plant described here under this name has since been identified as an undescribed species and named *Arundinaria nitida*.

*__Aspidistra typica,__ Baill. (*W. G.* 1894, 266.) Liliaceæ. S. A new species, supposed to have been introduced fron Tonkin, with general habit and aspect of *A. elatior* but differing from that in its trimerous symmetry. (Jardin des Plantes, Paris.)

__Asplenium Drueryi,__ Hort. (*Gard.* 1894, xlv., 472.) Filices. H. A variety of *A. Baptistii* with broader pinnæ, which are conspicuously crested. (H. B. May.)

__Baccharis salicina,__ Torr. & Gray. (*Spaeth Cat.* 1894–5.) Compositæ. H. A bush 6 ft. high, with narrow, willow-like, gray-green leaves. Western North America. (Spaeth, Berlin.)

*__Bambusa angustifolia,__ Mitford. (*Gard.* 1894, xlvi., 547.) Bambuseæ. H. A dwarf hardy bamboo, with slender stems 1 ft. high, much branched, purplish when young; leaves 4½ in. by ½-in., serrated, green with silver stripes. Syn. *B. Vilmorini*, Hort. Japan. (A. B. Freeman-Mitford.)

*__Bambusa Castillonis,__ Hort. (*G. C.* 1894, xv., 368. A hardy species, stems 6 ft. or more high, yellowish; leaves variegated, 7 in. by 1⅓ in., serrated on both margins. "Kimmei-chiku." Japan. (Kew.) [Probably a Phyllostachys.]

*__Bambusa chrysantha,__ Hort. (*G. C.* 1894, xv., 368.) A hardy species, with slender stems 3 ft. or more high, leaves 7 in. by 1¼ in., green, striped with yellow, slightly glaucous beneath. Japan. (Kew.) [This is probably only a form of *Arundinaria Simoni.*]

*__Bambusa disticha,__ Mitford. (*Gard.* 1894, xlvi., 547.) H. This name has been given to a dwarf hardy bamboo long cultivated under the name of *B. nana*, Hort. (not of Roxburgh). Stems 2 ft. high, thin, with distichously arranged branches and leaves, the latter 2 in. by ½ in. rigid, evergreen. ? Japan.

*__Bambusa Henonis,__ Hort. (*G. C.* 1894, xv., 368.) A hardy bamboo, probably a variety of *Phyllostachys Quilioi.* Japan. (Kew.)

*__Bambusa Laydekeri,__ Hort. (*G. C.* 1894, xv., 368.) A hardy bamboo; stems 3 ft. or more high, round, much branched; leaves 6 in. long, narrow, green mottled with dull yellow. Japan. (Kew.)

__Bambusa marmorea,__ Mitford. (*Gard.* 1894, xlvi., 547.) A hardy bamboo with stems 3 ft. or more high, slender, purplish, freely branched; leaves 4½ in. by ½ in., bright green, serrated, with a constriction on one side near the apex. The sheaths which enclose the young stems are purple, marbled with silver grey. Syn. *B. Kan-chiku*, Hort. Japan. (A. B. Freeman-Mitford.)

__Bambusa Nagashima,__ Hort. (*Gard.* 1894, xlvi., 547.) A dwarf hardy bamboo; stem about 2 ft. high, round, purplish; leaves 6 in. by ¾ in., serrated; leaf-sheaths hairy. Japan. (A. B. Freeman-Mitford.)

*__Bambusa pumila,__ Hort. (*G. C.* 1894, xv., 368.) A hardy bamboo with thin stems less than 3 ft. high, unbranched; leaves 4½ in. by ¾ in. covered with short hairs. Japan. (Kew.)

*__Bambusa pygmæa,__ Miquel. (*G. C.* 1894, xv., 368.) A hardy bamboo and the dwarfest in cultivation; stems less than 1 ft. high, creeping and branching freely; leaves 4 in. by ½ in., green. Japan. (Kew.)

__Bambusa senanensis,__ Franchet. (*G.* 1894, xlvi., 546.) A hardy species, closely allied to *Arundinaria Veitchii;* stems thin, erect, about a foot high; leaves ovate, 6 in. long. Japan. (A. B. Freeman-Mitford.)

*__Bambusa sterilis,__ Hort. Japan. (*G. C.* 1894, xv., 368.) This appears to be a form of *B. nana*, Roxb. Japan. (Kew.)

__Begonia platanifolia,__ Schott, vars. __decora, illustris__ and __pulvinata.__ (*G. C.* 1894, xv., 663.) Begoniaceæ. S. Three distinct varieties are thus named and distributed by L'Horticulture Internationale, Brussels.

*__Begonia President Carnot.__ (*G. C.* 1894, xvi., 399, fig. 53.) S. A garden hybrid between *B. Olbia* and *B. coccinea.* (M. Crozy, Lyons.)

*__Begonia Rajah,__ Ridley. (*G. C.* 1894, xvi., 213, fig. 31.) S. A dwarf species, closely allied to *B. gogoensis.* but differs in having terete hairy petioles, unequally cordate blades coloured rich metallic green and coppery red. The flowers which are inconspicuous are pale pink, and borne in loose erect racemes. Malaya. (F. Sander & Co.)

*__Begonia Rex × socotrana.__ (*G. C.* 1894, xvi., 669.) S. A garden hybrid between the two species indicated by the name. (F. Sander & Co.)

__Bellevallia Aucheri,__ Hort. (*B. T. O.* 1894, 227.) Liliaceæ. H. A species with long fleshy broad leaves and dense racemes of small purplish tinted flowers. The correct name is *Hyacinthus Aucheri*, Baker. Persia. (Dammann & Co., Naples.)

***Betula Maximowiczii,** Regel. (*G. C.* 1894, xvi., 718.) Cupuliferæ. H. A handsome Japanese tree introduced to cultivation by Professor C. S. Sargent, Arnold Arboretum. It has large leaves and orange-coloured bark. Yezo.

***Biarum Spruneri,** Boiss. (*B. T. O.* 1894, 19.) Aroideæ. H. H. A species nearly allied to the South European *B. tenuiflorum.* Greece.

***Bifrenaria Charlesworthii,** Rolfe. (*K. B.* 1894, 184.) Orchideæ. G. A new species allied to *B. racemosa.* Pseudobulbs 4-angled $1\frac{1}{2}$ in. long; leaves 9 in. long; scape 6 in. long, bearing about six flowers about $\frac{3}{4}$ in. long and coloured yellow, with a few red-brown spots on the lip. Brazil. (Charlesworth & Co., and Kew.)

***Brachychilum Horsfieldii,** Peters. (*G. C.* 1894, xv., 652.) Scitamineæ. S. A monotypic genus; stems erect, 2 ft. long; leaves oblong lanceolate nearly 1 ft. long; flowers in a terminal spike, yellow. Java. (Kew.)

***Brachystelma caffrum,** N. E. Br. (*G. C.* 1894, xvi., 62.) Asclepiadeæ. G. A small trailer with a tuberous rootstock, stems 5 in. long, ovate leaves less than an inch long, and flowers half an inch in diameter, corolla rotate, yellow. S. Africa. (Kew.)

Brodiæa Howellii, Wats., var **lilacina,** (*Gard.* 1894, xlvi., 502, pl. 992.) Liliaceæ. H. A variety with delicate lilac-tinted flowers. (Van Tubergen, Haarlem.)

***Buddleia pulchella,** N. E. Brown. (*K. B.* 1894, 389.) Loganiaceæ. G. A new species, unlike any other in the genus. It forms a compact bush 2 ft. high, covered with hastate or irregularly lobed leaves 2 in. long and bearing short terminal panicles of small tubular yellowish-white flowers. South Africa? (Kew.)

Bulbophyllum hookerianum, Kränzlin. (*G. C.* 1894, xv., 685.) Orchideæ. S. "A rather commonplace Bolbophyllum," with creeping rhizome, oblong 4-angled pseudobulbs each bearing a pair of oblong leaves 2 in. long; scape nodding, bearing small yellow flowers. Trop. West Africa. (Herrenhausen.)

Bulbophyllum Johannis, Kränzlin. (*G. C.* 1894, xvi., 592.) S. A new species, diminutive in all its characters; flowers white, $\frac{1}{4}$ in. in diameter. Madagascar. (Herrenhausen.)

Bulbophyllum leysianum, Burbidge. (*O. R.* 1894, 294.) S. Allied to *B. Dearei*, with large solitary flowers on scapes 6 in. long; dorsal sepal yellow with purple veins, lateral sepals connate, pink and purple. (Borneo.)

Bulbophyllum perpusillum, Kränzlin. (*G. C.* 1894, xvi., 592.) S. A new species and one of the smallest known. "The creeping stems are thinner than ordinary silk thread; the bulbs and leaves are one to two lines in length, and the leaves about half a line in breadth." Madagascar. (Herrenhausen.)

***Bulbophyllum pteriphilum,** Rolfe. (*K. B.* 1894, 391.) S. A new species with elongated rhizomes, small oblong pseudobulbs, and linear oblong leaves; scape 4 in. long, bearing numerous distichous small white flowers. Penang. (Kew.)

***Calathea polytricha,** Baker. (*G. C.* 1894, xvi., 467.) Scitamineæ. S. A new species allied to *C. flavescens*, but with hairy leaves and bracts. Tubers globose, leaves green, flowers many in a rosette, sessile in the centre of the tuft of leaves. Trinidad. (Kew.)

Calochortus Plummeræ, Hort. Wallace. (*G. C.* 1894, xvi., 133, fig. 21.) Liliaceæ. H. A handsome species, with flowers of a delicate shade of lilac. California. (Wallace & Co.)

***Calochortus Weedii,** Wood. (*G. C.* 1894, xvi., 183, fig. 27.) H. This is placed by Mr. Baker as a var. of *C. luteus.* The flowers are rich yellow, the whole surface being covered with long brownish hairs. California. (Wallace & Co.).

Camaridium lawrencianum, Rolfe. (*K. B.* 1894, 185.) Orchideæ. S. A new species allied to *C. purpuratum*, from which it differs in having pseudobulbs 1 in. long, the leaves 3 in., narrow, and the flowers $\frac{1}{2}$ in., yellowish white spotted with purple, the lip being dark purple; they are borne singly on axillary peduncles. Hab. not recorded. (Sir T. Lawrence.)

***Caraguata conifera,** André. (*B. M.* t. 7359.) Bromeliaceæ. S. A near ally to *C. lingulata*, but larger in all its parts. It has a dense rosette of green leaves 3 ft. long and 2 in. broad, and a central erect peduncle bearing a cone-like head 4 in. long of bright scarlet bracts enclosing the yellow tubular flowers. Ecuador. (Kew.)

***Caralluma Luntii,** N. E. Br. (*K. B.* 1894, 335.) Asclepiadeæ. S. A new species with 4-angled smooth stems 8 in. high and $\frac{3}{4}$ in. thick, conspicuously toothed, and marbled with purple. Flowers 1 in. in diameter, with a five-lobed tube, coloured yellowish-green with purple spots. South Arabia. (Kew.)

Catasetum chloranthum, Cogn. (*J. O.* 1894, 251.) Orchideæ. S. This species has the general aspect of *C. macrocarpum* and flowers about the same size as that species or slightly larger. The sepals are pale green with rosy blotches, the petals also pale green but with more definite rosy blotches. (L'Horticulture Internationale.)

Catasetum discolor, Lindl., var. **vinosum,** Cogn. S. (*J. O.* 1894, 240, 252.) This differs from the type in having flowers of a vinous red colour. Brazil. (L'Horticulture Internationale.)

Catasetum finetianum, L. Lind. & Cogn. (*J. O.* 1894, 362.) S. Flowers in lax spikes, the long, narrow whitish sepals and petals are suffused and spotted with purple; the oblong lip nearly acute at the tip, margins entire, strongly incurved. Colombia. (L'Horticulture Internationale.)

***Catasetum Lemosii,** Rolfe. (*K. B.* 1894, 393.) S. A new species allied to *C. albovirens*. Pseudobulbs fusiform 6 in. long; leaves 8 in. by $2\frac{1}{4}$ in.; scape 1 ft. long, erect, many flowered; flowers $1\frac{1}{2}$ in. across, brownish yellow, the lip light green and yellow. Brazil. (Kew.)

Catasetum macrocarpum, var. **Lindeni,** O'Brien. (*L.* t. 442; *G. C.* 1894, xvi., 306.) See *C. splendens.*

Catasetum pallidum, Cogn. (*J. O.* 1894, 252.) S. This species comes near *C. finetianum* from which it differs principally in its shorter sepals and petals and more fleshy lip. Habitat not recorded. (L'Horticulture Internationale.)

Catasetum punctatum, Rolfe. (*K. B.* 1894, 364.) S. A new species allied to *C. albovirens*. Pseudobulbs fusiform, 6 in. long; leaves broad-lanceolate 10 in. long; scape 8 in. long, bearing about 12 aromatic flowers, which are 2 in. across, the sepals and petals yellow green, with brown spots, the lip dark yellow. Brazil. (L'Horticulture Internationale.)

***Catasetum Randii,** Rolfe. (*K. B.* 1894, 394.) S. A new species allied to *C. garnettianum*, which it resembles in habit, differing only in the lip, which has a short, broad brush-like appendage. Brazil. (Kew.)

Catasetum revolutum, Cogn. (*J. O.* 1894, 303.) S. The flowers in this are of the same texture as those of *C. splendens*, the sepals and petals are a slightly greenish pale yellow, the lip forming a less deep and much narrower pouch than in *C. splendens*. Habitat not recorded. (L'Horticulture Internationale.)

Catasetum rodigasianum, Rolfe, var. **tenebrosum,** Rolfe. (*L.* t. 406.) S. A variety with much darker coloured flowers than the type. Brazil. (L'Horticulture Internationale.)

***Catasetum splendens,** Cogn. (*O. R.* 1894, 356; *J. O.* 1894, 302.) S. A supposed natural hybrid, between *C. Bungerothii* and *C. macrocarpum*. The following are named varieties:—*aureum, aurantiacum, flavescens, Lindeni, Luciani, maculatum, obrienianum, regale, viride.* ? Brazil. (L'Horticulture Internationale.)

***Cattleya Aclandiæ,** Lindl., var. **maxima.** (*L.* t. 421.) Orchideæ. S. A variety with larger flowers and deeper colours than the type. (L'Horticulture Internationale.)

Cattleya arthuriana, J. O'Brien. (*G. C.* 1894, xv., 102.) G. A garden hybrid between *C. dormaniana* and *C. luteola*. (C. Dorman.)

Cattleya Atlanta. (*O. R.* 1894, 275.) G. A garden hybrid between *C. Leopoldii* and *C. Warscewiczii.* (J. Veitch & Sons.)

Cattleya bicolor, Lindl., var. **caerulea.** (*G. C.* 1894, xvi., 378.) G. A variety with greenish sepals and petals and blue labellum. (T. Statter.)

Cattleya Browniæ. (*G. C.* 1894, xvi., 447; *O. R.* 1894, 334.) G. A garden hybrid between *C. bowringiana* and *C. Harrisonae.* (F. Sander & Co.)

Cattleya citrina aurantiaca, Gower. (*O.R.* 1894, 194.) G. Differs from the type in its larger and richer coloured flowers and more elongated lip. (C. E. Field.)

Cattleya Cupidon, Hort. (*L.* t. 440.) G. Apparently a pale coloured variety of *C. Mendeli*, although suggested to be intermediate between it and *C. Schroederae.* (L'Horticulture Internationale.)

Cattleya Eldorado, Linden, var. **Lindeni.** (*L.* t. 409.) G. A variety with rosy-purple flowers and a richly coloured lip. (L'Horticulture Internationale.)

Cattleya Eldorado, Linden, var. **Oweni.** (*L.* t. 409.) G. A variety with white sepals and petals, the lip also white with a yellow blotch and a band of rose-crimson. (L'Horticulture Internationale.)

Cattleya Fabia. (*G. C.* 1894, xvi., 604.) S. A garden hybrid between *C. labiata* and *C. dowiana.* (J. Veitch & Sons.)

Cattleya Gigas franconvillensis, Williams. (*O. A.* t. 505.) G. A variety with pure white sepals and petals and a crimson and yellow lip. (Duc de Massa, Franconville.)

Cattleya hardyana, Rolfe, var. **Luciana.** (*L.* t. 449.) G. A variety with large flowers which might properly be called a form of *C. Warscewiczii* (*Gigas*). (L'Horticulture Internationale.)

Cattleya kienastiana. (*G. C.* 1894, xvi., 257.) G. A garden hybrid between *C. aurea* and *C. labiata*, var. *luddemaniana.* (F. Sander & Co.)

Cattleya labiata, Ldl., var. **foleyana.** (*G. C.* 1894, xvi., 447; *O. A.* t. 497.) G. A large flowered variety with white sepals and petals and blotches of orange and crimson on the lip. (G. D. Owen.)

Cattleya labiata, Lindl., var. **Peetersii.** (*O. R.* 1894, 78.) G. A variety with dark rose-purple flowers, irregularly variegated with a lighter shade. (A. A. Peeters, Brussels.)

Cattleya Mantinii. (*O. R.* 1894, 365; *Gard.* 1894, xlvi., 458.) S. A garden hybrid between *C. bowringiana* and *C. dowiana aurea.* (G. Mantin, Olivet, France.)

Cattleya Mossiæ, Hook, var. **Treyeranæ,** Lind. (*L.* t. 438.) G. A variety with flowers of medium size and rich colours, the lip being especially gaudy. (L'Horticulture Internationale.)

Cattleya Mossiæ, Hook, var. **wambekeana,** L. Lind. (*L.* t. 433.) G. A variety with very large, richly coloured flowers. (C. van Wambeke, Belgium.)

Cattleya venosa, Rolfe. (*O. R.* 1894, 182.) G. Supposed to be a natural hybrid between *C. harrisoniana* and *C. Forbesii.* (L'Horticulture Internationale.)

Cattleya Wendlandii. (*G. C.* 1894, xvi., 447.) G. A garden hybrid between *C. bowringiana* and *C. Warscewiczii.* (J. Veitch & Sons.)

***Cereus Pecten-aboriginum,** Watson. (*G. & F.* 1894, 334, fig. 54.) Cacteæ. S. A tree Cactus, 20–30 ft. high, trunk 1 ft. in diameter with 10 or 11 ribs, armed with straight ash-coloured spines. Flowers 2–3 in. long, purple and white. (It has been suggested that this is *C. macrogonus* of Salm-Dyck.) Sonora.

Chamaepeuce afra, DC. (*Gfl.* 1894, 47.) Compositæ. H. H. A handsome thistle-like plant with a rosette of dark green, white-blotched leaves and a flower-stem about 2½ ft. high bearing from 8 to 12 bright purple flower-heads. Armenia. (Max Leichtlin, Baden.)

Chœnomeles japonica, Lindl., var. **serotina,** André. (*R. H.* 1894, 424, fig. 155, 156.) Rosaceæ. H. A late flowering form of the typical *Pyrus japonica.* (M. F. Morel, Lyon-Vaisse, France.)

Coccinia Moghadd, Aschers. (*B. T. O.* 1894, 115, fig. 31.) Cucurbitaceæ. S. A tall-growing perennial gourd with palmately-lobed leaves, whitish yellow flowers, and carmine red ovoid fruits. Abyssinia. (Dammann & Co., Naples.)

Cœlogyne Mossiæ, Rolfe. (*K. B.* 1894, 156; *G. C.* 1894, xv., 400, fig. 49.) Orchideæ. S. A new species allied to *C. nervosa.* Pseudobulbs 1½ in. long ovate, diphyllous; leaves 6 in. long; raceme 6 in. long, bearing about six flowers each 1½ in. across, pure white with a yellow crescent-shaped mark on the lip. Nilghiri Mts. (J. S. Moss.)

***Cœlogyne swaniana,** Rolfe. (*K. B.* 1894, 182; *G. C.* 1894, xv., 539; *R.* t. 92.) S. A new species, allied to *C. dayana* but with shorter pseudobulbs, leaves, and racemes. The flowers are white with a brown lip veined with yellow. Philippines. (F. Sander & Co.)

Cornus mas, L., var. **Mietzschii,** Schwerin. (*Gfl.* 1894, 556.) Cornaceæ. A form of garden origin with leaves marbled, spotted and striped with grey, white and green. (Mietzsch, Wendisch-Wilmersdorf.)

***Crassula hybrida albiflora,** Hort. (*Lemoine,Catalogue* 1894.) Crassulaceæ. G. A hybrid between *Crassula jasminea* and *Rochea odorata.* (Lemoine, Nancy.)

***Crinum Doriæ,** Terracc. (*B. T. O.* 1894, 19.) Amaryllideæ. S. The leaves are broad, wavy at the margins, the scape short, surmounted by a many-flowered umbel of scented, white, red striped flowers. Abyssinia.

Crinum grandiflorum, Hort. (*R. H.* 1894, 147.) H. H. A garden "hybrid between *C. careyanum* and *C. capense.*" (Deleuil, Marseilles.)

Cucumis Vilmorini, Hort. (*B. T. O.* 1894, 115.) Cucurbitaceæ. H. H. An annual plant with cut leaves. The fruits are abundantly produced, are canary-yellow in colour and armed with soft spines. Origin not recorded.

Cupania grandidens, Hort. (*Bull Cat.* 1894, 15.) Sapindaceæ. S. "An erect shrubby plant, with downy stems, pinnate leaves, the leaflets 4 in. long, sinuately lobate." Zanzibar. (W. Bull.)

***Cupressus macrocarpa,** Hartw. var. **lutea.** (*Gard.* 1894, xlv., 33.) Coniferæ. H. A well-marked form, entirely suffused with pale golden yellow. (Dicksons & Co., Chester.)

***Cyanastrum cordifolium,** Oliver. (*G. and F.* 1894, 404.) Hæmodoraceæ. S. A monotypic genus with a creeping rootstock, cordate leaves 6 in. long on stalks 9 in. long, and purple stellate flowers an inch across, on short erect scapes. West tropical Africa. (Kew.)

Cyathea mastersiana, L. Linden. (*G. C.* 1894, xv., 663.) Filices. S. Remarkable for its thin stem, which is 2 ft. high surmounted with graceful fronds 3–4 ft. long, the bases of which are spinous. Habitat not recorded. (L'Horticulture Internationale.)

Cyathea pygmæa, L. Linden. (*G. C.* 1894, xv., 663.) S. "Stem about 2 ft. high, fronds dark green not shining." (L'Horticulture Internationale.)

Cymbidium armainvilliense. (*J. O.* 1894, 9.) Orchideæ. S. A garden hybrid between *C. eburneum* and *C. lowianum.*

***Cyphia tortilis,** N. E. Br. (*K. B.* 1894, 356.) Campanulaceæ. G. "Barroes." A new species allied to *C. sylvatica.* Tubers succulent, edible; stem climbing, leaves spathulate or lanceolate, 1 in. long; flowers axillary, small, lilac. South Africa. (Kew.)

Cypripedium allanianum. (*O. R.* 1894, 22.) Orchideæ. S. A garden hybrid between *C. spicerianum* and *C. Curtisii.* (United States Nurseries.)

Cypripedium Anton Joly. (*G. C.* 1894, xv., 198.) S. A garden hybrid between *C. vernixium* and *C. spicerianum.* (A. Joly, Vienna.)

Cypripedium Arnoldiæ. (*G. C.* 1894, xvi., 378.) S. A garden hybrid between *C. bellatulum* and *C. superciliare.* (F. Sander & Co.)

Cypripedium beechense. (*G. C.* 1894, xv., 762.) S. A garden hybrid between *C. Curtisii* and *C. superbiens.* (W. R. Lee.)

Cypripedium behrensianum. (*O. R.* 1894, 111.) S. A garden hybrid between *C. Boxalli* and *C. Io-grande.* (F. Sander & Co.)

Cypripedium callosum, Rchb. f., var. **Sanderæ.** (*G. C.* 1894, xv., 663; *O. R.* 1894, 197.) S. A pale coloured variety with the dorsal sepal snow-white with a few lines of emerald green at the base. (F. Sander & Co.)

Cypripedium calloso-Argus. (*O. R.* 1894, 110.) S. A garden hybrid between the two species indicated by the name. (H. Graves, New Jersey.)

Cypripedium Dallemagnei. (*L.* t. 411.) S. A garden hybrid between *C. spicerianum* and *C. lowianum.* (L'Horticulture Internationale.)

Cypripedium denisianum, L. Lind. (*G. C.* 1894, xvi., 118; *L.* t. 437.) S. A garden hybrid between *C. selligerum* and *C. superbiens.* (L'Horticulture Internationale.)

Cypripedium Echo. (*O. R.* 1894, 111.) S. A garden hybrid between *C. Hookeræ* and *C. insigne.* (H. Graves, New Jersey.)

Cypripedium Eurydice. (*R. H.* 1894, 90.) S. A garden hybrid between *C. leeanum superbum* and *C. hirsutissimum.*

Cypripedium excellens. (*O. R.* 1894, 275.) S. A garden hybrid between *C. rothschildianum* and *C. harrisianum.* (T. Statter.)

Cypripedium gibezianum. (*L.* t. 425.) S. A garden hybrid between *C. villosum* and *C. venustum.* (Mad. E. Gibez, Sens.)

Cypripedium gloriosum. (*O. R.* 1894, 365.) S. A garden hybrid between *C. insigne Chantini* and *C. Io-grande.* (T. Statter.)

Cypripedium Godefroyæ leucochilum. (*O. R.* 1894, 145; *G. C.* 1894, xv., 717; *L.* t. 431.) S. A variety with spotted sepals and petals and a pure white lip. (O. O. Wrigley.)

Cypripedium Gravesiæ. (*G. C.* 1894, xv., 298, fig. 34.) S. A garden hybrid between *C. Argus* and *C. niveum.* (H. Graves, New Jersey.)

Cypripedium harrisianum, Rchb. f. var. **virescens.** (*O. R.* 1894, 235.)

S. Differs from the type in having yellowish-green flowers without any purple-brown markings. (H. Little.)

Cypripedium Horneri. (*O. R.* 1894, 80.) S. A garden hybrid between *C. Boxalli* and *C. Argus.* (H. Horner.)

Cypripedium insigne, Wall., var. **Gortoni.** (*G. C.* 1894, xvi., 336.) G. A new variety, peculiar in having no brown markings in the flowers. (P. McArthur.)

***Cypripedium insigne,** Wall., var. **montanum.** (*L.* t. 414.) G. This name has been given to a series of forms of *C. insigne,* some of which are distinguished by their narrower shorter leaves and richly marked flowers.

Cypripedium Inspirator. (*R. H. B.* 1894, 25.) S. A garden hybrid between *C. spicerianum* var. *superbum* and *C. tonsum.* (Jules Hye, Ghent.)

Cypripedium Io-spicereanum. (*O. R.* 1894, 143.) S. A garden hybrid between the species indicated by the name. (W. Vanner.)

Cypripedium Iris. (*J. O.* 1894, 8.) S. A garden hybrid between *C. javanico-superbiens* and *C. ciliolare.* (M. Bleu, Paris.)

Cypripedium J. G. Fowler. (*O. R.* 1894, 361, fig. 18.) S. A garden hybrid between *C. Godefroyæ* and *C. barbatum.* (H. Low & Co.)

Cypripedium Janet Ross. (*O. R.* 1894, 311.) S. A garden hybrid between *C. swanianum* and *C. harrisianum.* (H. J. Ross, Florence.)

Cypripedium J. H. Veitch. (*G. C.* 1894, xvi., 258, 287, fig. 40.) S. A garden hybrid between *C. Curtisii* and *C. Stonei* var. *platytænium.* (J. Veitch & Sons.)

Cypripedium Jupiter. (*R. H.* 1894, 89.) S. A garden hybrid between *C. Boxalli atratum* and *C. hirsutissimum.* (Vuyisteke, Ghent.)

Cypripedium Lauræ. (*O. R.* 1894, 80.) S. A garden hybrid between *C. villosum* and *C. superciliare.* (R. le Doux.)

Cypripedium leysenianum. (*R. H. B.* 1894, 169, t.; *G. C.* 1894, xv., 817.) S. A garden hybrid between *C. barbatum* var. and *C. bellatulum.* (Jules Hye, Ghent.)

Cypripedium Madame Jules Hye. (*G. C.* 1894, xv., 198.) S. A garden hybrid between *C. tonsum* and *C. spicerianum.* (J. Hye, Ghent.)

Cypripedium Mme. Octave Opoix (*J. O.* 1894, 310.) S. A garden hybrid between *C. superciliare* and *C. niveum.* (Luxemburg Garden, Paris.)

Cypripedium Moensii. (*O. R.* 1894, 335.) S. A garden hybrid between *C. spicerianum* and some unknown species. (T. Statter.)

Cypripedium Morganiæ var. **langleyense.** (*G. C.* 1894, xv., 84; *O. R.*, 1894, 79.) S. A garden hybrid between *C. superbiens* and *C. stonei* var. *platytænium.* (J. Veitch & Sons.)

Cypripedium Nandi. (*G. C.* 1894, xvi., 318.) S. A garden hybrid between *C. callosum* and *C. tautzianum.* (R. J. Measures.)

Cypripedium oenanthum, Rchb. f., var. **punctatum.** (*O. R.* 1894, 334.) S. A garden hybrid between *C. harrisianum,* var. and *C. insigne,* var. (H. Little.)

Cypripedium Pandora. (*G. C.* 1894, xv., 230.) S. A garden hybrid between *C. Argus* and *C. dayanum.* (A. Joly, Vienna.)

Cypripedium Pelias. (*O. R.* 1894, 144.) S. A garden hybrid between *C. haynaldianum* and *C. insigne.* (H. Graves, New Jersey.)

Cypripedium poyntzianum. (*G. C.* 1894, xv., 36; *O. R.* 1894, 54.) S. A supposed natural hybrid between *C. callosum* and *C. Hookeræ.* (R. Young.)

Cypripedium robinianum. (*O. R.* 1894, 79.) S. A garden hybrid between *C. Parishii* and *C. Lowii.* (L'Horticulture Internationale.)

Cypripedium triumphans. (*G. C.* 1894, xv., 198.) S. A garden hybrid between *C. œnanthum superbum* and *C. Sallieri hyeanum.* (J. Hye, Ghent.)

Cypripedium William Lloyd. (*G. C.* 1894, xvi., 731, 757, fig. 97.) S. A garden hybrid between *C. bellatulum* and *C. swanianum.* (P. Weathers.)

Cypripedium Winifred Hollington. (*G. C.* 1894, xv., 475, 495, fig. 60.) S. A garden hybrid between *C. niveum* and *C. callosum.* These are also the parents of *C. Aylingii.* (A. J. Hollington.)

Cypripedium W. R. Lee. (*G. C.* 1894, xvi., 194.) S. A garden hybrid between *C. superbiens* and *C. elliottianum.* (W. R. Lee.)

***Cyrtanthus O'Brieni,** Baker. (*G. C.* 1894, xv., 716.) Amaryllideæ. S. A new species intermediate between *C. angustifolius* and *C. Macowani.* Leaves linear, contemporary with the flowers, which are bright scarlet, 1½ in. long, about eight in an umbel. S. Africa. (J. O'Brien.)

***Cyrtopera flexuosa,** Rolfe. (*K. B.* 1894, 363.) Orchideæ. S. A new species. Pseudobulbs ovoid 1 in. long, bearing four linear elongate flaccid leaves nearly 1 ft. long; scape erect, 1 ft. long, flexuose; flowers nearly 1 in. across, white, with purple spots and a yellow blotch on the lip. East Trop. Africa. (Kew.)

Delphinium armeniacum, Stapf. (*Gfl.* 1894, 48.) Ranunculaceæ. H. A perennial species with azure-blue flowers. General habit of plant is similar to that of *D. Ajacis,* but more robust. Armenia. (Haage & Schmidt, Erfurt.)

Delphinium Emiliæ, *Greene. G. C.* 1894, xvi., 434.) H. A dark blue species, 1½ to 2 ft. high, near *D. hesperium* and *D. variegatum.* California. (University of California.)

Delphinium Nuttalli, Hort. (*Gard.* 1894, xlvi., 511.) H. Growing 2–2½ ft. high. Flowers white with sky blue spots on the upper segments. N. America. (T. Smith, Newry.)

Dendrobium Alcippe. (*G. C.* 1894, xv., 475.) Orchideæ. S. A garden hybrid between *D. lituiflorum* and *D. wardianum.* (J. Veitch & Sons.)

Dendrobium Augustæ Victoriæ, Kränzlin. (*Gfl.* 1894, 115.) S. Described as a new species but since identified as *D. veratrifolium,* Ldl., a native of New Guinea. (F. Sander & Co.)

Dendrobium Cordelia. (*O. R.* 1894, 173.) S. A garden hybrid between *D. aureum* and *D. euosmum leucopterum.* (J. Veitch & Sons.)

Dendrobium Cybele. (*G. C.* 1894, xv., 343.) S. A garden hybrid between *D. findlayanum* and *D. nobile.* (J. Veitch & Sons.)

Dendrobium Doris. (*O. R.* 1894, 142.) S. A garden hybrid between *D. leechianum* and *D. moniliforme.* (N. C. Cookson.)

Dendrobium Euryalus. (*O. R.* 1894, 142.) S. A garden hybrid between *D. Ainsworthii* and *D. nobile.* (J. Veitch & Sons.)

***Dendrobium glomeratum,** Rolfe. (*K. B.* 1894, 155.) S. A new species allied to *D. cumulatum,* but larger in flower; pseudobulbs 2½ ft. long; flowers in short dense axillary racemes with large imbricating bracts, the sepals and petals bright rose colour and the lip orange. Moluccas. (J. Veitch & Sons.)

Dendrobium hamatum, Rolfe. (*K. B.* 1894, 183.) S. A new species with slender pseudobulbs 2 ft. long; leaves oblong acuminate 5 in. long; racemes axillary, many flowered; flowers 1½ in. wide, sepals and petals pale yellow with lines of purple dots, lip pandurate yellow with a purple stain on the front lobe.* Cochin China. (A. Regnier, Fontenay.)

***Dendrobium Hildebrandii,** Rolfe. (*K. B.* 1894, 182.) S. A new species allied to *D. tortile;* pseudobulbs 2 ft. long; leaves 5 in. long, 1¼ in. wide; racemes numerous, axillary; flowers 3 in. across, the sepals and petals twisted and coloured pale dull yellow, the lip, which is short and roundish, being orange. Some variation in colour is shown among cultivated plants. Burma. (H. Low & Co.)

Dendrobium lutwycheanum. (*O. R.* 1894, 203.) S. A garden hybrid between *D. wardianum* and *D. splendidissimum grandiflorum.* (G. Lutwyche.)

Dendrobium mettkeanum, Kränzlin. (*G. C.* 1894, xvi., 306.) S. A new species very near to *D. nitidissimum* with flowers like those of *D. treacherianum.* Hab. not recorded. (F. Sander & Co.)

Dendrobium sanderianum, Rolfe. (*K. B.* 1894, 155.) S. A new species, most like *D. Dearei,* but with larger flowers and the lip stained with purple instead of green at the base; they are borne in axillary clusters of two or three. Borneo. (F. Sander & Co.)

Dendrobium subclausum, Rolfe. (*K. B.* 1894, 362.) S. A new species with slender pseudobulbs 1½ ft. long, oblong leaves 1 in. long and short racemes bearing a few flowers ¾ in. long and coloured brilliant orange. Moluccas. (J. Veitch & Sons.)

Dendrobium Virginia. (*G. C.* 1894, xv., 343.) S. A garden hybrid between *D. moniliforme* and *D. Bensoniæ.* (J. Veitch & Sons.)

Dendrobium wardianum, Warner, var. **Lindeniæ.** (*L.* t. 419.) S. A variety with pure white flowers save a large blotch of yellow at the base of the labellum. (L'Horticulture Internationale.)

Dendrobium wardianum, Warner, var. **pictum.** (*G. C.* 1894, xv., 298.) S. A variety with pale amethystine sepals crimson at the tips, petals white with crimson tips, and lip bright in colour. (J. Broome.)

Dendrobium wiganianum. (*O. R.* 1894, 143.) S. A garden hybrid supposed to be between *C. harrisianum* and *C. Ashburtoniæ.* (Sir F. Wigan.)

Deutzia discolor, Hemsl., var. **purpurascens.** (*R. H.* 1894, 244; *Jard.* 1894, 147, fig. 64.) Saxifrageæ. A form with rose-purple tinted flowers. Yunnan. (Jardin des Plantes, Paris).

Deutzia Lemoinei. (*Jard.* 1894, 85.) H. A hybrid between *D. gracilis* and *D. parviflora.* (Lemoine, Nancy.)

***Dianella tasmanica,** Hook. f., var. **variegata.** (*Bull. Cat.* 1894, 3.) Liliaceæ. G. An elegant plant with ensiform leaves a foot or more long, green, striped with yellow. Flowers blue in a loose, branched panicle. Tasmania. (W. Bull.)

Dichorisandra acaulis, Cogn. (*Ill. H.* 1894, 297, t. 19.) Commelinaceæ. S. An almost stemless plant with a rosette of nearly sessile glossy leaves of an intense green with a large number of short longitudinal stripes of silvery white; under surface deeply tinted with violet purple. Flowers deep violet blue. Brazil. (L'Horticulture Internationale.)

***Dictyosperma fibrosum,** Wright. (*K. B.* 1894, 358.) Palmeæ. S. A tropical Palm, native of Madagascar. Stem slender, about 5 ft. high, 2¼ in. in diameter; leaves pinnate 5 ft. long, petioles 2 ft. long; leaflets 1½ ft. long, 1 in. wide; fruit sub-globose 8 lin. in diam. Local name, "Vonitra." Yields *Piassava* fibre. (Kew.)

Diervilla praecox, Hort. (*Lemoine Catalogue,* 1894.) Caprifoliaceæ. H. A hardy shrub resembling *D. amabilis* in habit but flowering three or four weeks earlier. Flowers with carmine tube, fine rose limb and yellow throat. Japan. (Lemoine, Nancy.)

***Dioscorea caucasica,** Alboff. (*G. C.* 1894, xv., 778.) Dioscoreaceæ. H. A graceful climber with the lower leaves in whorls of three to five, the upper being nearly opposite. It is in general aspect like *Tamus communis.* Caucasus. (H. Correvon, Geneva.)

Disa Diores. (*G. C.* 1894, xvi., 49.) Orchideæ. G. A garden hybrid between *D. Veitchii* and *D. grandiflora.* (J. Veitch & Sons.)

***Disa langleyensis.** (*G. C.* 1894, xvi., 35, fig. 5.) G. A garden hybrid between *D. tripetaloides* and *D. racemosa.* (J. Veitch & Sons and Kew.)

***Disa nervosa,** Lindl. (*G. C.* 1894, xvi., 308, fig. 41.) G. A handsome species with strap-shaped leaves and erect tall scapes, 2 ft. high bearing racemes of bright rose-coloured flowers with spreading segments and a straight spur an inch long. Natal. (Kew.)

***Dyckia desmetiana,** Baker. (*B. M.* t. 7340.) Bromeliaceæ. S. An acaulescent species with ensiform thick recurved leaves 2 ft. long armed with marginal prickles. Peduncle 2 ft. long, panicle 2 ft. long, branched, flowers ½ in. long, red. Brazil. (Kew).

Echinocactus glaucus, Schum. (*Spaeth Cat.* 1894–5.) Cacteæ. H. A new species with handsome large rose-coloured flowers. Mountains of Colorado. (Spaeth, Berlin.)

***Elliottia racemosa,** Muhl. (*G. and F.* 1894, vii., 206, fig. 37.) Ericaceæ. H. A shrub closely related to Rhododendron and Ledum, with thin alternate membranous leaves and terminal racemes or racemose panicles of white flowers. Georgia. (P. J. Berckmans, Augusta, Georgia.)

***Epidendrum Ellisii,** Rolfe. (*K. B.* 1894, 184.) Orchideæ. G. A new species with stems 1½ ft. high, leaves 4 in. long and short racemes of rose-coloured flowers with a yellowish crest on the lip. Colombia. (W. S. Ellis.)

***Epidendrum Hartii,** Rolfe. (*K. B.* 1894, 157.) S. A new species, allied to *E. purum;* stems 8 in. long; leaves linear, 4 in. long; flowers in branched terminal panicles small, whitish yellow. Trinidad. (Glasnevin.)

Epidendrum Wallisio-ciliare. (*G. C.* 1894, xvi., 730.) S. A garden hybrid between the two species indicated by the name. (J. Veitch & Sons.)

Epilælia hardyana. (*G. C.* 1894, xvi., 605, 629, fig. 80; *O. R.* 1894, 364.) Orchideæ. G. A garden hybrid between *Epidendrum ciliare* and *Lælia anceps.* (F. Sander & Co.)

Eria cinnabarina, Rolfe. (*K. B.* 1894, 183; *L.* t. 448.) Orchideæ. S. A new species allied to *E. bractescens.* Pseudobulbs 1 in. long, leaves 6 in. long, racemes 4 in. long, each bearing about six flowers, each an inch across, with lanceolate bracts, the whole inflorescence coloured rich cinnabar orange. Borneo. (L'Horticulture Internationale.)

***Eriocnema Sanderæ** = **Bertolonia.** (*G. M.* 1894, 658, fig.) Melastomaceæ. S. A seedling variety of *Bertolonia marmorata*. (F. Sander & Co.)

***Erycina echinata,** Lindl. (*B. M.* t. 7389.) Orchideæ. S. An Oncidium-like little plant with tufted stems bearing bracts and a 2-leaved pseudobulb, the leaves 2–4 in. long, green with brown stripes. Raceme axillary 6 in. long bearing about a dozen yellow flowers nearly an inch in diameter, with a large flat three lobed lip. Mexico. (Kew).

Eschscholtzia cucullata, Greene. (*G. C.* 1894, xvi., 434.) Papaveraceæ. H. A remarkable species with incurved leaves and small lemon yellow flowers. N. California. (University of California.)

Eschscholtzia maritima. (*Gfl.* 1894, 48.) H. This differs from *E. californica* in its grayish white leaves and in its lighter yellow flowers with an orange blotch at the base of each petal. (Haage & Schmidt, Erfurt.)

Eucomis robusta, Baker. (*G. C.* 1894, xvi., 562.) Liliaceæ. G. A new species near *E. regia*, from which it differs by its narrow, long, ensiform, acute leaves, which are 2 ft. long; scape short, an inch in diameter, raceme dense, 6 in. to 8 in. long, flowers campanulate, green, tinged with brown. Natal. (Dammann & Co., Naples.)

***Eupatorium serrulatum,** DC. (*R. H.* 1894, 304, t.) Compositæ. G. A shrub with shortly stalked, bright green leaves and heads of rosy-lilac flowers. Uruguay. (André, Lacroix, Touraine, France.)

Eurotia lanata, Moq. (*Spaeth Cat.* 1894–5.) Chenopodiaceæ. H. An erect shrub with thick-felted twigs and narrow whitish-gray leaves, and reddish fruits. Western North America. (Spaeth, Berlin.)

Fagus rotundifolia. (*G. C.* 1894, xv., 762.) Cupuliferæ. H. A round-leaved variety of the common beech. (G. Jackman & Son, Woking.)

Fagus sylvatica, L., var. **atropurpurea Rohani,** Hort. (*W. G.* 1894, 273.) H. A form of garden origin in which the leaves are similar to those of the fern-leaved beech in form but like those of the copper beech in colour. (Masek, Sichrow.)

***Fraxinus bungeana,** D.C. (*G. and F.* 1894, vii., 4, fig. 1.) Oleaceæ. H. A small tree belonging to the "Ornus" group, a native of Northern China. (Arnold Arboretum.)

***Fraxinus rhyncophylla,** Hance. (*G. and F.* 1893, vi., 484, fig. 70.) H. A fine Ash, easily distinguished from other species by its winter buds which are globose, half an inch in diameter, with broad scales covered with a coat of thick rufous tomentum. Northern China, &c. (Arnold Arboretum.)

Fuchsia pendula. (*R. H.* 1894, 470, figs. 174, 175.) Onagrarieæ. G. A garden hybrid with pendulous branches. (Berger, Bagnolet, France.)

Fuchsia triphylla hybrida. (*M. G. Z.* 1894, 13, fig.) G. A garden hybrid between *F. triphylla* and *F. corymbiflora*. (Arends & Pfeifer, Ronsdorf, Germany.)

***Galanthus Elwesii,** Hk. f., var. **unguicularis,** Baker. (*J. of H.* 1894, xxviii., 179.) Amaryllideæ. H. A good variety of *G. Elwesii*, of erect habit, and distinguished by its claw-like segments. Asia Minor. (Whittall, Smyrna.)

***Galeandra lagoensis,** Hort. Sander. (*G. C.* 1894, xvi., 103.) Orchideæ. S. "A very singular species, with greenish sepals and large rose-crimson lip." (F. Sander & Co.)

***Gastrochilus albo-luteus,** Baker. *G. C.* 1894, xvi., 34.) Scitamineæ. S. A new species in the way of *G. longifolius*, but the flowers are smaller with a flat white labellum, lined with bright yellow; leaves oblong, 9 in. long, green. Andamans. (Kew.)

***Gastrochilus Curtisii,** Baker. (*B. M.* t. 7363.) S. A new species, allied to *G. longiflora*, Wall. Rootstock fleshy, leaves oblong lanceolate, stalked, nearly 2 ft. long, hairy beneath. Flowers in a cluster in the sheathing bases of the leaves, an inch across, white, the lip yellow with a red margin. Malaya. (Kew.)

***Gazania bracteata,** N. E. Br. (*G. C.* 1894, xv. 620.) Compositæ. H. A new species, allied to *G. longiscapa*. Leaves in a rosette, linear 5–8 in. long. Peduncles 6 in. long. Flower heads 2 in. across, ray florets white, purple beneath, disc yellow. Syn. *G. nivea*, Hort. Natal. (W. E. Gumbleton.)

Geonoma decora, Lind. & Rod. (*Ill. H.* 1894, 361, t. 23.) Palmeæ. S. A dwarf pinnate-leaved palm with reddish-brown leafstalks and smooth deep green narrow leaflets. Habitat not recorded. (L'Horticulture Internationale.)

Geranium sessiliflorum, Cav. (*G. C.* 1894, xv., 778.) Geraniaceæ. H. A dwarf growing plant, with thick leaves and almost sessile, white and purple flowers. New Zealand. (H. Correvon, Geneva.)

Gerardia tenuifolia, Vahl. (*Gfl.* 1894, 48.) Scrophularineae. H. A perennial about 1½ ft. high with linear light green leaves and pale violet Pentstemon-like flowers. Mexico.

***Githopsis specularioides,** Nuttall. (*G. C.* 1894, xvi., 244, 245, fig. 34.) Campanulaceæ. H. A pretty annual, in general appearance like the "Venus' looking glass," but differing in the dehiscence of the capsule. Flowers blue. California. (Kew.)

***Gladiolus aurantiacus,** Klatt., var. **rubro-tinctus,** Baker. (*G. C.* 1894, xvi., 152.) Irideæ. H. A variety with orange yellow flowers thickly dotted all over with red. S. Africa. (Kew.)

Gladiolus massiliensis. (*W.G.* 1894, 34.) H. A new race of garden origin between *G. psittacinus* and *G. gandavensis*. (Deleuil, Marseilles.)

Gloriosa abyssinica, A. Rich. (*B. T. O.* 1894, 228.) Liliaceæ. S. A smaller growing species than *G. superba*, but with perianth segments twice as broad as in that species. Abyssinia. (Dammann & Co., Naples.)

Glossopetalon meionandrum, Koehne. (*Gfl.* 1894, 237, fig. 52.) Celastrineæ. H. A compact, much branched, small-leaved thorny shrub with inconspicuous whitish flowers. Colorado, &c. (Spaeth, Berlin.)

***Gmelina hystrix,** Schult. (*Bot. Mag.* t. 7391; *G. C.* 1894, xv., 746.) Verbenaceæ. S. A climbing shrub with the habit of Bougainvillea; leaves elliptic oblong or lobed; flowers in short dense terminal cone-like spikes formed of large red-purple bracts and irregularly campanulate yellow flowers 3 in. long. Philippine Islands. (Kew.)

Grammatophyllum Guilelmi II., Kränzlin. (*Gfl.* 1894, 114.) Orchideæ. S. Described as a new species, but since determined at Kew to be *G. rumphianum*, Miq. A native of Borneo, &c. (F. Sander & Co.)

Graya polygaloides, Hook. & Arn. (*Spaeth Cat.* 1894–5.) Chenopodiaceæ. H. A bush with whitish twigs and dull green lanceolate leaves; fruits rose-coloured. Western North America. (Spaeth, Berlin.)

Gymnogramme Veitchii. (*G. C.* 1894, xvi., 446; *G. and F.* 1894, 433.) Filices. S. Supposed to be a hybrid between *G. decomposita* and *G. Pearcii robusta*. (J. Veitch & Sons.)

***Gymnostachyum decurrens,** Stapf. (*K. B.* 1894, 357.) Acanthaceæ. S. A new species with short branching stems, ovate wavy leaves 4 in. long, coloured green and grey with a purplish midrib; flowers in a spike 8 in. long, white, with purple stalk. Pahang. (Kew.)

***Gynerium saccharoides,** H. & B. (*Bot. Mag.* t. 7352.) Gramineæ. S. A tall grass, the stems 12 ft. or more high, 1 in. in diameter at the base, solid, clothed with distichous leaves 5 ft. long by 1 in. wide. Panicle 5–6 ft. long, elegantly arched and not unlike the common Pampas Grass. The heads are largely used for the decoration of rooms and are known as "Uva Grass." Tropical America. (Kew.)

***Habenaria carnea,** var. **nivosa,** Hort. (*O. R.* 1894, 290.) Orchideæ. S. Differs from the type in having white instead of flesh coloured flowers and unspotted leaves. (W. L. Lewis & Co.)

***Haemanthus candidus,** Hort. Bull. (*Bull. Cat.* 1894, 3.) Amaryllideæ. G. A new species with the habit of *H. coccineus*, having large heads of pure white flowers on scapes 9 in. long. Transvaal. (W. Bull.) [This is *H. Allisoni*, Baker.]

***Haemanthus Clarkei.** (*G. C.* 1894, xvi., 498.) A garden hybrid between *H. albiflos* and *H. coccineus*, raised by Col. Trevor Clarke. (Kew.)

Halimodendron argenteum, var. **flore purpureo.** (*Spaeth Cat.* 1894–5.) Leguminosæ. H. A form differing from the type in its deep rosy purple flowers. (Spaeth, Berlin.)

***Hedychium Elwesii,** Baker. (*G. C.* 1894, xvi., 152.) Scitamineæ. S. A near ally of *H. coronarium* but with larger bracts and rich golden yellow flowers.) Himalaya. (F. Sander & Co.)

***Hedychium wilkeanum.** (*G. C.* 1894, xvi., 276.) S. A garden hybrid between *H. coronarium* and *H. gardnerianum*. (Rotterdam B. G.)

Helianthus lenticularis. (*Gfl.* 1894, 104, fig. 25.) Compositæ. H. A sunflower said to attain a height of 12 ft.

in rich ground. Flower-heads yellow, medium size. (Kropp, Berlin.)

***Hemitelia Lindeni**, L. Linden. (*G. C.* 1894, xv., 663.) Filices. S. Stem not 2 in. in circumference, and nearly 2 ft. high; fronds large, handsome. ? Brazil. (L'Horticulture Internationale.)

Hibiscus esculentus, L., var. **speciosus**, Hort. (*Gfl.* 1894, 622, fig. 111.) Malvaceæ. H. A handsome annual with large sulphur yellow flowers blotched with blood red at the base of the petals.

***Honckenya ficifolia**, Willd. (*G. C.* 1894, xvi., 498.) Malvaceæ. S. A shrub with the habit of Sparmannia, palmately lobed leaves and purple flowers 4 in. across, borne in short terminal racemes. W. trop. Africa. (Kew.)

***Houlletia Landsbergi**, Linden & Reich. f. (*B. M.* t. 7362.) Orchideæ. S. First described in 1855 but only lately re-introduced. Pseudobulbs an inch long, leaf 12 in. by 4 in., strongly ribbed; peduncle 4 in. long, stout, purplish; flowers large, fleshy, 3 in. across, sepals oblong, orange, with red spots, petals smaller and notched; lip narrow, with four horn-like lobes, white tinged with purple. Costa Rica. (Kew.)

***Hydnophytum longiflorum**, *A. Gray.* (*B. M.* t. 7343.) Rubiaceæ. S. One of the remarkable insect-harbouring plants, the base of the stem being swollen and tuber-like, and chambered as if hollowed out by maggots. The stems proper in this species are terete with opposite ovate fleshy green leaves and axillary clusters of white sessile tubular flowers half an inch long. Fiji. (Kew.)

***Hymenocallis Deleuilii**, Hort. (*R. H.* 1894, 218.) Amaryllideæ. S. A vigorous plant with scape 2½ ft. in height, bearing an umbel of from 12 to 20 flowers. Cochin China. (Deleuil, Marseilles.) [This is *H. littoralis*, Salisb.]

***Hypericum moserianum**, var. **tricolor.** (*Jard.* 1894, 186, fig. 93.) Hypericineæ. H. This has leaves variegated with white and rosy-carmine. (Léon Chenault, Orleans.)

***Hypocyrta pulchra**, N. E. Br. (*G. C.* 1894, xvi., 244.) Gesneriaceæ. S. A new species with stout hairy stems, hairy fleshy, elliptic-ovate leaves 5 in. long, and solitary axillary flowers, an inch long, hairy and coloured orange-yellow. Colombia. (J. Veitch & Sons.)

Ipomœa Kerberii, Hort. (*B. T. O.* 1894, 116, fig. 32.) Convolvulaceæ. G. A species with heart-shaped leaves and clusters of vivid scarlet flowers which completely cover the plant in Southern Italy when cultivated in the open air. South America. (Dammann & Co., Naples.)

Ipomœa setifera, Poir. (*B. T. O.* 1894, 116.) G. A plant with cut leaves and a profusion of white, perfumed flowers. Temperate Brazil. (Dammann & Co., Naples.)

***Ipomœa Woodii**, N. E. Br. (*G. and F.* 1894, 123; *K. B.* 1894, 100.) S. A tuberous rooted perennial, with woody stems, cordate purple-tinted leaves and short-stalked clusters of large bell-shaped rose-purple flowers. Zululand. (Kew.)

Iris Agatha. (*Gard.* 1894, xlvi., 157.) Irideæ. H. A garden hybrid between *I. iberica*, var. and *I. Korolkowi venosa.* (C. G. van Tubergen, Haarlem.)

***Iris Helenæ**, *Barbey.* (*G. M.* 1894, 220; *J. of H.*, 227, fig. 38.) H. A large flowered, dark purple Iris with a dwarf habit, close to *I. iberica.* Holy Land. (T. S. Ware, Tottenham.)

Iris Ibparad. (*Gard.* 1894, xlvi., 157.) H. A garden hybrid between *I. iberica* and *I. paradoxa.* (C. G. Van Tubergen, Haarlem.)

Iris reticulata, *Bbrst.*, var. **alba.** (*G. M.* 1894, 75.) H. A white form with orange yellow crests. (T. S. Ware, Tottenham.)

Iris stylosa, Desf. (*Gard.* 1894, xlvi., 248.) H. Five forms of this species are figured here.

Kalanchoe Cassiopeia, Hort. (*Gfl.* 1894, 93.) Crassulaceæ. G. A dwarf succulent, with Echeveria-like blue-green, toothed leaves. Abyssinia. (Dammann & Co., Naples.)

Kalanchoe glaucescens, Britten. (*W. G.* 1894, 457, fig. 70.) G. A species sometimes attaining a height of 2 ft. or upwards with a terete glabrous stem and irregularly crenate obtuse leaves. Flowers in panicles red or dark yellow. Abyssinia. (Dammann & Co., Naples.)

Lælia amœna. (*O. R.* 1894, 334.) Orchideæ. G. A garden hybrid between *L. anceps* and *L. pumila.* (C. Ingram.)

Lælia anceps, Ldl., var. **ashworthiana.** (*G. C.* 1894, xv., 84, 103, fig. 10.) G. Flowers snow-white with bluish veinings in the labellum. (F. Sander & Co.)

Lælia anceps, Ldl., var. **hollidayana.** (*G. C.* 1894, xv., 84.) G. Remarkable for the rich crimson veining in the labellum. (F. Sander & Co.)

Lælia elegans, Rchb. f., var. **nobilis.** (*G. C.* 1894, xvi., 257.) G. A variety with flowers of a clear rosy-crimson tint. (F. Sander & Co.)

Lælio-Cattleya amplissima, (*J. O.* 1894, 253.) Orchideæ. G. A hybrid, the parents of which are not given. (L'Horticulture Internationale.)

Lælio-Cattleya broomfieldiensis. (*G. C.* 1894, xvi., 194, 223, fig. 33.) G. A garden hybrid between *Lælia pumila,* var. *præstans* and *Cattleya aurea,* var. *chrysotoxa.* (M. Wells.)

Lælio-Cattleya Cauwenberghei. (*L.* t. 428.) G. A garden hybrid supposed to be between *Cattleya granulosa* and *Lælia purpurata.* (L'Horticulture Internationale.)

Lælio-Cattleya Clonia. (*G. C.* 1894, xvi., 511.) G. A garden hybrid between *Lælia elegans Turneri* and *Cattleya Warscewiczii.* (J. Veitch & Sons.)

Lælio-Cattleya corbeillensis. (*R. H.* 1894, 527.) G. A garden hybrid between *C. Loddigesii* and *C. dayana marginata.* (C. Maron, France.)

Lælio-Cattleya Decia. (*G. C.* 1894, xvi.,. 670, 699, fig. 89.) G. A garden hybrid between *Lælia Perrinii* and *Cattleya dowiana aurea.* (J. Veitch & Sons.)

Lælio-Cattleya Doris. (*O. R.* 1894, 79, 111.) G. A garden hybrid between *Lælia harpophylla* and *Cattleya Trianæ.* (N. C. Cookson.)

Lælio-Cattleya Frederick Boyle. (*G. C.* 1894, xv., 663, 809, fig. 105.) G. A garden hybrid between *L. anceps* and *C. Trianæ.* (F. Sander & Co.)

Lælio-Cattleya Hon. Mrs. Astor. (*G. C.* 1894, xv., 230, fig. 24; *R.* t. 89.) G. A garden hybrid between *Lælia xanthina* and *Cattleya labiata gaskelliana.* (F. Sander & Co.)

Lælio-Cattleya Lindeni. (*L.* t. 447.) G. A variety of *L.-C. elegans,* remarkable for the rich plum-red colour of its flowers. (L'Horticulture Internationale.)

Lælio-Cattleya Parysatis. (*O. R.* 1894, 310.) G. A garden hybrid between *Cattleya bowringiana* and *Lælia pumila.* (J. Veitch & Sons.)

Lælio-Cattleya pittiana. (*G. C.* 1894, xv., 264.) G. A supposed natural hybrid between *Cattleya guttata Prinzii* and *Lælia grandis.* (F. Sander & Co.)

Lælio-Cattleya sayana. (*J. O.* 1894, 220.) G. A hybrid the parentage of which is not given. (L'Horticulture Internationale.)

Lælio-Cattleya schilleriana leucotata. (*O. R.* 1894, 237; *L.* t. 413.) G. A pure white variety, according to the figure of it published in *Lindenia,* where it is called *L.-C. elegans leucotata.* In the collection of Mr. R. H. Measures however it produced flowers flushed with rose. (L'Horticulture Internationale.)

Lælio-Cattleya Timora. (*G. C.* 1894, xvi., 49; *G. M.* 1894, 405, fig.) G. A garden hybrid between *Cattleya labiata* var. *luddemaniana* and *Lælia pumila* var. *dayana.* (J. Veitch & Sons.)

Lælio-Cattleya Wellsiæ. (*G. C.* 1894, xvi., 378.) G. A garden hybrid between *Lælia purpurata* and *Cattleya labiata,* var. (M. Wells.)

Lælio-Cattleya Zephyra. (*G. C.* 1894, xvi., 103.) G. A garden hybrid between *Lælia xanthina* and *Cattleya Mendeli.* (J. Veitch & Sons.)

Lanium Berkeleyi, Rolfe. (*K. B.* 1894, 392.) Orchideæ. S. A new species, with small linear oblong pseudobulbs, short leaves and racemes bearing small green flowers with minute red-brown dots. Brazil. (Major Gen. E. S. Berkeley.)

***Lathyrus lætiflorus,** Greene. (*G. C.* 1894, xv., 398.) Leguminosæ. H.H. A plant growing 6 to 8 ft. high, with nearly white or flesh coloured flowers. (University of California.)

***Lathyrus violaceus,** Greene. (*G. C.* 1894, xv., 398.) H.H. A new species from California, 6 to 8 ft. high, with racemes of violet blue flowers. (University of California.)

***Lecanopteris carnosa,** Blume. (*K. B.* 1894, 398.) Filices. S. An epiphytic fern with a crust-like rhizome which spreads irregularly and is covered with teat-like projections. Leaves pinnate 6–12 in. long. It is allied to Polypodium. Penang. (Kew.)

***Leptactina Mannii,** Hook. f. (*B. M.* t. 7367.) Rubiaceæ. S. A branched shrub 6 ft. high with oblong leathery green leaves 5–8 in. long. Flowers in terminal clusters white, with a slender corolla tube 4 in. long and five spreading lobes 2½ in. long. Tropical West Africa. (Kew.)

Leucocoryne purpurea, C.Gay. (*Gard.* 1894, xlvi., 144.) Liliaceæ. H. A bulb with grassy leaves, and scapes bearing 2–8 lavender and crimson maroon flowers. Chili. (Max Leichtlin, Baden.)

*__Lilium Browni__, var. **leucanthum**, Baker. (*G. C.* 1894, xvi., 183.) Liliaceæ. G. A distinct variety, the flowers being untinged with brown outside and marked with yellow inside; the tube is less distinctly trumpet shaped and the leaves are broader than in the type. Western China. (Kew.)

Lissochilus graniticus, Schweinf. (*B. T. O.* 1894, 229.) Orchideæ. S. A handsome terrestrial orchid with large leaves and tall spikes of golden-yellow and violet flowers. Abyssinia. (Dammann & Co., Naples.)

Lobelia Dortmannii, Hort. (*W. G.* 1894, 459, fig. 72.) Campanulaceæ. G. Apparently a form of *L. Erinus.* (Dammann & Co., Naples.)

Lobelia Gerardi. (*R. H. B.* 1894, 207. H. A garden hybrid between *L. syphilitica* and *L. cardinalis.* (Chabanne, Lyons.)

*__Lonicera Korolkowii__, Stapf. (*G. and F.* 1894, vii., 34, fig. 4.) Caprifoliaceæ. H. A very free-flowering bush honeysuckle allied to *L. Xylosteum.* Flowers yellowish-white; fruit orange red. (Arnold Arboretum.)

*__Lowia maxillarioides__, Ridley. (*B. M.* t. 7351.) Scitamineæ. S. A ginger-like plant with tufted distichous lanceolate leaves 9 in. long and loose short panicles of flowers in which the three large purple sepals and the odd green lip-like petal are suggestive of an orchid. Malay Peninsula. (Kew.)

Lunaria biennis, Moench. var. **variegata.** (*Jard.* 1894, 29, fig. 9.) Cruciferæ. H. A form with leaves broadly margined with yellowish-white. (Vilmorin Andrieux & Co.)

*__Lupinus fallax__, Greene. (*G. C.* 1894, xvi., 434.) Leguminosæ. H.H. An ornamental bush, 3–5 ft. high, with silvery foliage and spikes of violet flowers. Mt. Tamalpais, California. (University of California.)

Lupinus Micheneri, *Greene.* (*G. C.* 1894, xvi., 434.) H. Herbaceous perennial of spreading prostrate habit, with dull purplish or brownish-green flowers. N. California. (University of California.)

Lycaste schönbrunnensis. (*G. C.* 1894, xvi., 118, fig. 18.) Orchideæ. G. A garden hybrid between *L. gigantea* and *L. Skinneri.* (Emperor of Austria, Schönbrunn.)

Magnolia biflora, Hort. (*R. H.* 1894, 148.) Magnoliaceæ. H. H. A garden form of *M. grandiflora.* (Treyve, Trévoux, France.)

*__Mallotus japonicus__, Muell. (*R. H.* 1894, 103, fig. 32.) Euphorbiaceæ. G. A bush or small tree with alternate, cordate-acuminate leaves and inconspicuous paniculate flowers. Has proved hardy at Toulouse. (Bonamy, Toulouse.)

Mammillaria barbata, Engelm. (*Gfl.* 1894, 113, t. 1400.) Cacteæ. G. One of the larger growing species with rosy-pink flowers an inch in diameter. Mexico. (Haage & Schmidt, Erfurt.)

Mammillaria Purpusi, Schum. (*Spaeth Cat.* 1894–5.) H. A new species very thickly beset with spines and rose-red flowers. Mountains of Colorado. (Spaeth, Berlin.)

Mammillaria spaethiana, Schum. (*Spaeth Cat.* 1894–5.) H. Similar in armature and flowers to *M. Purpusi*, but depressed globose in form. Mountains of Colorado. (Spaeth, Berlin.)

Maranta fascinator, Lind. & Rod. (*Ill. H.* 1894, 105, t. 7.) Scitamineæ. S. A dwarf species with distichous leaves truncate at the base and slightly acuminate at the tip, purple beneath; ground-colour of upper surface dark green, silvery towards the centre, pale green towards the edges, nerves a fine red. Brazil. (L'Horticulture Internationale.)

Maranta massangeana, E. Morr. Vars. (*G. C.* 1894, xv., 663.) S. Plants which appear to be varieties of this sub-species have been named as follows by M. Linden of L'Horticulture Internationale: *albo-lineata*, *metallica*, *smaragdina*, *atrata*, *florentina*, *fulgida*. [*M. massangeana* is a variety of *M. bicolor*, Ker. Brazil.]

Masdevallia Asmodia. (*G. C.* 1894, xv., 762.) Orchideæ. G. A garden hybrid between *M. Chelsoni* and *M. reichenbachiana.* (J. Veitch & Sons.)

Masdevallia Doris. (*O. R.* 1894, 22.) G. A garden hybrid between *M. triangularis* and *M. racemosa.* (Captain Hincks.)

Masdevallia Jessie Winn. (*O. R.* 1894, 365.) G. A garden hybrid between *M. tovarensis* and *M. Davisii.* (C. Winn.)

Masdevallia Mary Ames. (*G. and F.* 1894, 66.) G. A garden hybrid, between *M. ignea* and *M. gáiriana.* (W. Robinson, Mass.)

Maxillaria Lindeniæ, Cogn. (*J. O.* 1894, 362.) Orchideæ. G. A beautiful large-flowered species with somewhat fleshy, milk white acuminate sepals. The petals are the same colour as the sepals, but have two or three pale rose-coloured lines; lip very pale yellow, with five or six reddish bands on the lateral lobes. (L'Horticulture Internationale.)

Maxillaria mirabilis, Cogn. (*L.* t. 417; *O. R.* 1894, 75.) G. A new species, allied to *M. fucata.* Pseudobulbs small compressed; leaves linear oblong 12 in. long; scapes 8 in. long, each bearing a single flower 2 in. across, the sepals reflexed, orange and crimson spotted with dark brown, the petals much smaller, yellow with red-brown spots and lines, and the lip yellow with a marginal row of spots. Hab. not recorded. (L'Horticulture Internationale.)

Maxillaria sanderiana, Rchb. f. var. **fuerstenbergiana,** Kränzlin. (*G. C.* 1894, xv., 526.) G. A variety in which the flowers are ivory white, with only very few pale purplish spots on the petals. (F. Sander & Co.)

Megaclinium nummularia, Kränzlin. (*G. C.* 1894, xv., 685.) Orchideæ. S. Closely allied to *M. minutum.* It has flattened pseudobulbs, leaves 1 in. long, raceme shorter, with 6–8 minute purplish flowers. German Cameroons. (Herrenhausen.)

Megaclinium pusillum, Rolfe. (*K. B.* 1894, 362.) S. A new species, allied to *M. melanorhachis.* Pseudobulbs ovoid, 1 in. long; leaves linear oblong, 3 in. long; scape 4 in. long, flattened, bearing small green and purple flowers. East Tropical Africa. (Glasnevin.)

***Megaclinium triste,** Rolfe. (*K. B.* 1894, 363.) S. A new species, allied to *M. leucorhachis.* Pseudobulbs trigonous, oblong, 2 in. long; leaves fleshy oblong 5 in. long; scape about a foot long, fleshy, club shaped, black-purple, and bearing numerous small black-purple flowers. ? Tropical Africa. (Kew.)

Melia Azedarach, L. var. **umbraculifera.** (*G. and F.* 1894, vii., 92, fig. 20.) Meliaceæ. G. The characteristic habit of this variety is signalized by its name.

Miconia velutina, Lind. & Rod. (*Ill. H.* 1894, 331, t. 21.) Melastomaceæ. S. A handsome foliage plant with brownish red stems, red leaf-stalks, and large leaves green above and purple-red beneath. Brazil. (L'Horticulture Internationale.)

Miltonia bleuana nobilior. (*G. C.* 1894, xv., 366; *O. R.* 1894, 355, fig.) Orchideæ. G. A handsome variety of a garden hybrid between *M. vexillaria* and *M. Roezlii.* (F. Sander & Co.)

Miltonia bleuana rosea. (*G. C.* 1894, xvi., 511.) G. A handsome variety, the flowers being blush white with an eye-like purple blotch and red lines in the blotch. (J. Hye, Ghent.)

Mormodes Cogniauxii, L. Lind. (*J. O.* 1894, 125.) Orchideæ. S. The flowers are somewhat larger than those of *M. rolfeanum* to which they have a general resemblance. Colombia. (L'Horticulture Internationale.)

***Musa aurantiaca,** G. Mann. (*G. C.* 1894, xv., 102.) Scitamineæ. S. A handsome species, allied to *M. coccinea,* but with bright yellow bracts and flowers. Assam. (Herrenhausen.)

Myosotis Traversi, *Hook. fil.* (*G. C.* 1894, xv., 778.) Boragineæ. H. A pretty yellow-flowered species with the habit of *M. alpestris.* New Zealand. (H. Correvon, Geneva.)

***Myrosma nana,** Baker. (*G. C.* 1894, xv., 652.) Scitamineæ. S. A new species, remarkable for its dwarf habit and very hairy leaves, variegated down the midrib with a longitudinal yellowish band. Flowers small, white, in dense distichous spikes. ? Brazil. (Kew.)

Narcissus cernuus × triandrus. (*G. M.* 1894, 275.) Amaryllideæ. H. A hybrid between these species is here described under the name of "Snowdrop." (Engleheart.)

Narcissus cyclamineus × obvallaris. (*G. C.* 1894, xv., 332, 333, fig. 39.) H. A hybrid of intermediate character between its two parents. (G. Engleheart.)

Narcissus triandrus × poeticus ornatus. (*G. M.* 1894, 275.) H. A hybrid intermediate in character between the two parents. (Engleheart.)

Nepenthes mixta, var. **sanguinea.** (*G. C.* 1894, xvi., 318.) Nepenthaceæ. S. A variety with pitchers coloured dark red brown. (J. Veitch & Sons.)

***Nerine appendiculata,** Baker. (*G. C.* 1894, xvi., 336.) Amaryllideæ. G. A new species, showing a new type of structure in the genus, the filaments having each at the base outside a strap-shaped process with two to four long apical teeth. In habit and in the size and colour of the flowers it agrees with *N. angustifolia.* Natal. (J. O'Brien.)

Nerine Stricklandii. (*G. C.* 1894, xvi., 690.) G. A garden hybrid between *N. curvifolia* and *N. pudica.* (Sir C. Strickland.)

***Neuwiedia Griffithii,** Rchb. f. (*O. R.* 1894, 276.) Orchideæ. S. This is dwarfer than *N. Lindleyi*, mentioned below, being only about a foot high; the flowers are small, pure white and borne in spikes 3 in. long. Malacca and Perak. (Kew.)

***Neuwiedia Lindleyi,** Rolfe. (*B. M.* t. 7368; *O. R.* 1894, 70.) S. A tall stout erect herb, 3–4 ft. high, with the habit and leaves of Curculigo and an erect scape bearing numerous short-stalked subcylindric flowers an inch long, golden yellow. Malaya. (Kew.)

Nidularium Innocenti, Lem., var. **fol. luteo var.** (*Ill. H.* 1894, 73, t. 5.) Bromeliaceæ. S. This differs from the type in having the leaves marked with longitudinal lines and bands of yellowish white. (L'Horticulture Internationale.)

***Nymphæa parkeriana,** Lehm. (*G. and F.* 1894, 164.) Nymphæaceæ. S. A species with the habit of *N. odorata* and large pure white fragrant flowers with yellow stamens. British Guiana. (Kew.)

Odontoglossum Coradinei, var. **mirabile,** Rolfe. (*O. R.* 1894, 198.) Orchideæ. G. A supposed natural hybrid between *O. crispum* and *O. lindleyanum.* Syn. *O. crispum mirabile.* (Baron Schröder.)

Odontoglossum cordatum aureum, Williams. (*O. A.* t. 489.) G. Differs from the type in having the segments blotched with greenish yellow. (B. S. Williams & Son.)

Odontoglossum crispum, Lindl. var. **Dallemagneæ.** (*L.* t. 420.) G. A variety with flowers of medium size, white, with an irregular blotch of red-brown on each segment, the lip being tinged with yellow and spotted with brown. (L'Horticulture Internationale.)

Odontoglossum crispum, Ldl. var. **grande-maculatum.** (*O. R.* 1894, 211.) G. A large and beautiful light-coloured spotted form, with very broad segments. (Baron Schröder.)

Odontoglossum crispum, Ldl., var. **lowianum.** (*G. C.* 1894, xv., 539.) G. A variety with spotted sepals, plain-edged concave petals with bands of brown. (H. Low & Co.)

Odontoglossum crispum, Ldl., var. **ocellatum.** (*L.* t. 429.) G. A variety with very small spots freely scattered over the segments. (L'Horticulture Internationale.)

Odontoglossum crispum, Ldl., var. **waltonense.** (*L.* t. 416.) G. A variety with large full flowers, the segments toothed and wavy and coloured rosy mauve on a white ground, with large dark brown blotches. (L'Horticulture Internationale.)

Odontoglossum crispum, Ldl., var. **wrigleyanum,** Williams. (*O. A.* t. 493.) G. A variety with large heavily blotched flowers, the blotches of a plum red colour. (O. O. Wrigley.)

Odontoglossum deltoglossum Stevensii. (*O. R.* 1894, 115.) G. A variety with a branched panicle of light yellow flowers spotted with red-brown, except on the petals which are nearly unmarked. (W. Thompson.)

Odontoglossum excellens, var. **harvingtense.** (*O. R.* 1894, 112; *J. O.* 1894, 2.) G. A variety with large handsome flowers coloured light yellow with numerous small pale brown spots. It was at first described as a natural hybrid between *O. crispum* and *O. sceptrum.* (Comte de Bousies.)

Odontoglossum Imperatrice de Russie. (*J. O.* iv., 360.) G. Supposed to be a natural hybrid between *O. Halli* and *O. polyxanthum.* Habitat not recorded. (M. Dallemagne, Rambouillet.)

Odontoglossum nebulosum, Lindl., var. **amabile.** (*L.* t. 450.) G. A variety with small red dots scattered liberally over the segments of the flower. (L'Horticulture Internationale.)

Odontoglossum Pescatorei, Linden, var. **Chaberiæ,** Lind. (*L.* t. 432.) G. A variety with pure white sepals and petals, and the lip copiously blotched with purple. (M. A. Chaber, Brussels.)

Odontoglossum Rossii, Lindl., var. **immaculatum,** Rolfe. (*O. R.* 1894, 132.) G. A variety in which every trace of spotting has vanished from the flower, leaving the petals and lip white and the sepals pale pink. (O. O. Wrigley.)

***Oncidium brevilabrum**, Rolfe. (*K. B.* 1894, 158.) Orchideæ. G. A new species with ovoid pseudobulbs 2 in. long, linear leaves 12 in. long, and many-flowered panicles of bright yellow flowers barred with brown and $\frac{3}{4}$ in. in diameter. Habitat not recorded. (L'Horticulture Internationale.)

Oncidium cristatum, Rolfe. (*K. B.* 1892, 210; *L.* t. 451.) G. First flowered in 1892. It is allied to *O. schillerianum*; pseudobulbs ovate 2 in. long, leaves linear, lanceolate 6–9 in. long; panicle branched arching, bearing numerous flowers $1\frac{1}{2}$ in. across and coloured bright yellow with a few red spots on the crest of the lip. Brazil. (L'Horticulture Internationale.)

Oncidium lucasianum, Rolfe. (*K. B.* 1894, 185; *G. C.* 1894, xv., 475, 497, fig. 61.) G. A new species with ovate diphyllous pseudobulbs 2 in. long, and erect loose racemes of golden yellow flowers in the way of *O. marshallianum*. Habitat not recorded. (F. Sander & Co.)

Oncidium refractum, Rchb. f. (*O. R.* 1894, 229.) G. Described in 1854 but only now introduced into cultivation. It is allied to *O. zebrinum*; the flowers are greenish-yellow with brown bars, the sepals and petals wavy and pointed, the column and lip reflexed. Colombia. (A. Van Imschoot, Ghent.)

Oncidium wheatleyanum, Hort. (*G. C.* 1894, xvi., 605.) G. Probably a variety of *O. Gardneri*, with purple-brown sepals and petals, the lip yellow, edged with brown, and the crest large and purple. (F. Wheatley.)

Ornithidium fragrans, Rolfe. (*K. B.* 1894, 157.) Orchideæ. G. A new species, allied to *O. densum*, but has shorter leaves and fewer but larger flowers; the latter are whitish suffused with purple and are fragrant. Habitat not recorded. (F. Sander & Co.)

***Ornithidium nanum**, Rolfe. (*K. B.* 1894, 395.) G. A new species with very small pseudobulbs, leaves and scapes 1 in. long, and small yellowish flowers. West Indies. (Kew.)

Pancratium trianthum, Herbert. (*B. T. O.* 1894, 229.) Amaryllideæ. S. A species with globose bulb 1 to 2 ins. in diameter, and a long neck with six to eight narrow straight leaves about a foot long. Peduncle short, slender, bearing one to three white flowers in an umbel. Tropical Africa. (Dammann & Co., Naples.)

Pennisetum rüppelianum, Hort. (*B. T. O.* 1894, 155.) Gramineæ. H. An ornamental annual grass about a yard in height. Abyssinia. (Dammann & Co., Naples.)

Pentstemon Gordoni, var. **splendens**, Hort. (*W. G.* 1894, 460, fig. 75.) Scrophularineæ. H. A handsome form with large dark blue flowers. (Haage and Schmidt, Erfurt.)

Phaio-Calanthe Arnoldiæ. (*G. C.* 1894. xv., 84.) Orchideæ. S. A garden hybrid between *P. grandifolius* and *C. Regnierii.* (F. Sander & Co.)

Phaius Marthiæ. (*G. C.* 1894, xv., 343.) Orchideæ. S. A garden hybrid between *P. Blumei* and *P. tuberculosus.* (F. Sander & Co.)

Phaius Oweniæ. (*G. C.* 1894, xv., 539.) S. A variety of *P. bicolor* with flowers of a rich dark colour. (F. Sander & Co.)

Phaius owenianus. (*G. C.* 1894, xv., 663, 787, fig. 102.) S. A garden hybrid between *P. bicolor Oweniæ* and *P. Humblotii.* This plant was awarded the prize given by the Royal Horticultural Society for the best hybrid orchid of 1894. (F. Sander & Co.)

Phalaenopsis Vesta. (*G. C.* 1894, xv., 343.) Orchideæ. S. A garden hybrid between *P. rosea leucaspis* and *P. Aphrodite.* (J. Veitch & Sons.)

Phyllagathis hirsuta, Cogn. (*Ill. H.* 1894, 41, t. 3.) Melastomaceæ. S. An almost stemless plant with large round green leaves like the other three species of the genus, but differing from them in the very short broadly rounded lobes of the calyx, in the obovate rounded petals, and in the ovary being nearly quite adherent to the calyx. Borneo. (L'Horticulture Internationale.)

***Phyllostachys nigra**, Munro, var. **punctata.** (*G. C.* 1894, xv., 368.) Bambuseæ. H. A variety with mottled stems. Syn. *Bambusa nigro-punctata.* Japan. (Kew.)

***Physalis Francheti**, Mast. (*G. M.* 1894, 626, fig. 5329; *G. C.* xvi., 434, 441, fig. 57.) Solanaceæ. H. Closely resembling *P. Alkekengi*, but with much larger bladders. Japan. (J. Veitch & Sons.)

Phytolacca decandra, L. var. **luteola**, André. (*R. H.* 1894, 471.) Phytolaccaceæ. H. A form only differing from the type in having the leaves a pale yellow, striped and spotted with bright green. (Treyve-Marie, Moulins, Allier, France.)

***Plectranthus cylindraceus,** Schweinf.? (*W. G.* 1894, 2.) Labiatæ. G. A somewhat succulent sub-shrub with small roundish leaves and lilac flowers. Abyssinia. (Dammann & Co., Naples.)

***Plectranthus hadiensis,** Schweinf. (*W. G.* 1894, 2.) G. A prostrate bush, much branched, with shortly-stalked, doubly-serrated, heart-shaped leaves and lilac-purple spotted flowers. Abyssinia. (Dammann & Co., Naples.)

***Plectranthus herbaceus,** Schweinf. (*W. G.* 1894, 2.) G. An erect herb with white-haired, long stalked, heart-shaped toothed leaves, and lilac flowers. Abyssinia. (Dammann & Co.)

***Plectranthus marrubioides,** Hochst. (*G. C.* 1894, xvi., 34.) G. A curious plant, with dense clusters of very small white flowers, forming long spikes; leaves small obovate-cuneate, sessile, fleshy. Abyssinia. (Dammann & Co.)

***Plectranthus Schweinfurthi,** Spr. (*W. G.* 1894, 1.) G. A dense growing dwarf bush with stalked, ovate, toothed leaves and dense, many flowered whorls of small blue flowers. Arabia. (Dammann & Co., Naples.)

Pleurothallis inflata, Rolfe. (*K. B.* 1894, 154.) Orchideæ. G. A new species with stems 6 ins. long, leaves 6 ins. long, 1 in. wide, and solitary whitish flowers. Colombia. (F. Sander & Co.)

Pleurothallis Kränzlini, Sander. (*G. C.* 1894, xvi., 103.) G. "A singular little species, with pretty purple and silver-white flowers." Habitat not recorded. (F. Sander & Co.)

Pleurothallis pernambucensis, Rolfe. (*K. B.* 1894, 361.) G. A new species allied to *P. testæfolia*, leaves oblong 1 in. long, fleshy; raceme ½ in. long, bearing six small green and purple flowers. Brazil. (W. L. Lewis & Co.)

Podochilus longicalcaratus, Rolfe. (*K. B.* 1894, 186.) Orchideæ. S. A new species allied to *P. unciferus*, stem 2 ft. long; leaves 1 in. long, ½ in. wide, raceme 1 in. long; flowers small, white and purple. Borneo. (L'Horticulture Internationale.)

Pogonia speciosa, Rchb. f. (*O. R.* 1894, 325.) Orchideæ. S. Stem erect, 4 ft. high with alternate ovate oblong glaucous leaves and two or three large purple apical flowers, not unlike those of a *Bletia*. Brazil. (F. Hardy.)

Polycycnis Lehmanni, Rolfe. (*K. B.* 1894, 365.) Orchideæ. S. A new species with oblong sulcate pseudobulbs 1 in. long, each bearing a lanceolate leaf 7 in. long; scape pendulous 9 in. long, many flowered; flowers 1½ in. across light brown spotted with purple; disc covered with long white hairs. Colombia. (Sir T. Lawrence.)

Polypodium schneiderianum. (*G. C.* 1894, xv., 665; *Gard.* 1894, xlv., 472.) Filices. G. A supposed garden hybrid between *P. aureum* and *P. vulgare elegantissimum*. The fronds are 2 ft. long, and the pinnæ are wavy and crested. (J. Veitch & Sons.)

Polystachya villosa, Rolfe. (*K. B.* 1894, 393.) Orchideæ. S. A new species with linear-lanceolate leaves 10 in. long, and an erect scape 3 in. long bearing small hairy white flowers with purple spots. E. Trop. Africa. (J. O'Brien.)

Prunus orthosepala, Koehne. (*G. and F.* 1894, vii., 184, fig. 34.) Rosaceæ. H. A densely branched twiggy shrub 4 or 5 ft. high and as much through. Flowers white, with exserted orange-coloured stamens; fruit globose, about an inch in diameter on a stout rigid stalk about half an inch long; skin very dark blue or nearly black with glaucous bloom, thick juicy yellow flesh of good flavour and quality. Texas. (Arnold Arboretum.)

Prunus Watsoni, Sargent. (*G. and F.* 1894, vii., 134, fig. 25.) H. A twiggy, dwarf plum with fruit two-thirds of an inch in diameter, with thick bright orange-red skin without bloom, and bright juicy yellow flesh, which, although slightly austere, is edible, and sometimes of good quality. Kansas, &c. (Arnold Arboretum.)

Pyrus Tschonoskii, Maxim. (*G. and F.* 1894, vii., 54, fig. 9.) Rosaceæ. H. "The only indigenous pear-tree which has been discovered in Japan, where the continental *Pyrus sinensis*, a common cultivated fruit-tree in all parts of the empire, has occasionally become naturalized." (Arnold Arboretum.)

Quercus pedunculata, Ehrh. var. **Ahlfvengreni,** Bolle. (*Gfl.* 1894, 451.) Cupuliferæ. H. A new form of the Pyramidal or "Cypress" oak. Sweden.

Quercus pedunculata, Ehrh. var. **Doumeti,** André. (*R. H.* 1894, 17, fig. 3.) H. A form of the common oak with laciniated leaves. (Treyve, Moulins (Allier), France.)

***Rhododendron Fordii,** Hemsl. (*K. B.* 1894, 5; *G. and F.* 1894, 363.) Ericaceæ. G. A new species near *R. Fortunei*, with dark green obovate leathery leaves 3 in. long and loose clusters of white flowers 2 in. in diameter. China. (Kew.)

***Rhododendron irroratum,** Franchet. (*B. M.* t. 7361.) G. Allied to *R. arboreum*. It forms a shrub 3 ft. or more high with robust stems, oblong lanceolate leaves 3–4 in. long and terminal heads of tubular flowers 1½ in. long, coloured creamy white with a tinge of rose on the reflexed lobes. China. (Kew.)

***Rhododendron jasminiflorum,** Hook. f. var. **roseum.** (*G. C.* 1894, xv., 720.) G. Differs from the type in having twice as many flowers in an umbel and coloured soft carmine-rose. Perak. (Kew.)

***Rhododendron Maddeni,** Hook. var. **longiflorum.** (*G. C.* 1894, xv., 684.) G. Differs from the type in its longer thicker pedicels and funnel-shaped corolla 5 in. long, colour dull rose outside, pale bluish inside. (Kew.)

***Rhododendron Schlippenbachii,** Maxim. (*G. C.* 1894, xv., 469, fig. 58; *Gard.* 1894, xlvi., pl. 972; *B. M.* t. 7373.) H. A deciduous species related to *R. sinensis*, stems 5 ft. high with large ovate leaves 2–4 in. long, and rosy-lilac flowers 3 in. across. Manchuria and Japan. (J. Veitch & Sons.)

***Ricinus zanzibarensis,** Hort. (*Gfl.* 1894, 75, fig. 20.) Euphorbiaceæ. A castor-oil plant in which the seeds are said to be much larger and different in shape from those of *R. communis*. The leaves are bright green with whitish veins. East Tropical Africa. (Haage & Schmidt, Erfurt.)

***Rubus japonicus tricolor,** Hort. (*G. C.* 1894, xvi., 96, fig. 15.) Rosaceæ. H. A slender-growing trailer with stems and leaf-stalks of rose colour; young leaves pink, older variegated with white. (J. Veitch & Sons.)

Rubus melanolasius, Focke. (*Spaeth Cat.* 1894–5.) H. A new species belonging to the Raspberry group. North-west America. (Spaeth, Berlin.)

Saccolabium longicalcaratum, Rolfe. (*K. B.* 1894, 186.) Orchideæ. S. A new species, allied to *S. compressum*. Stem short, leaves 4 in. long, 1½ in wide; raceme 6 in. long, many flowered, flowers small, pinkish purple. Burma. (Charlesworth & Co.)

***Salvia macrostachya,** Kunth. (*G. and F.* 1894, 114; *B. M.* t. 7372.) Labiatæ. G. A stout growing herbaceous shrub with quadrangular stems 6 ft. high, large cordate green leaves and terminal spikes, 6 in. long, of blue flowers over an inch long. Ecuador. (Kew.)

Sarcobatus vermiculatus, Torr. (Spaeth Cat. 1894–5.) Chenopodiaceæ. H. A white-barked thorny bush with narrow linear leaves. Western North America. (Spaeth, Berlin.)

Sarcochilus crassifolius, Rolfe. (*K. B.* 1894, 396.) Orchideæ. G. A new species with a climbing stem, short, ovate-oblong fleshy leaves and short scapes bearing a few small yellowish flowers. Hab. not known. (A. Van Imschoot, Ghent.)

Sarracenia Willisii. (*G. M.* 1894, 410, fig.) Sarraceniaceæ. G. A garden hybrid between *S. Courtii* and *S. melanorhoda*. (J. Veitch & Sons.)

***Saxifraga apiculata,** Engl. (*G. C.* 1894, xv., 556, 557, fig. 68.) Saxifrageæ. H. This is the plant that has been grown in gardens as *S. luteo-purpurea*, Hort. It is a supposed hybrid between *S. scardica* and *S. aretioides*.

Schomburghia rhinodora, var. **kimballiana.** (*G. C.* 1894, xvi., 731.) Orchideæ. S. "Somewhat resembles a tall, few-flowered spike of *Cattleya bowringiana*, the colour of the flowers being of the same purple hue, but the lip is open and not rolled over the column." Habitat not recorded. (H. Low & Co.)

***Scutellaria formosana,** N. E. Br. (*G. C.* 1894, xvi., 212.) Labiatæ. G. A new species, closely allied to *S. javanica*, but dwarfer and less hairy. It has square stems, ovate leaves 2 in. long and terminal racemes of purplish flowers. Hong Kong. (J. Veitch & Sons and Kew.) [This has since been identified with *S. javanica*.]

Selenipedium Helenæ. (*G. and F.* 1894, 66.) Orchideæ. S. A garden hybrid between *S. Wallisii* and *S. leucorrhodum*. (W. Robinson, Mass.)

Selenipedium Stella. (*O. R.* 1894, 110.) S. A garden hybrid between *S. vittatum* and *S. Schlimii*. (F. Sander & Co.)

Senecio kleinioides, Oliver. (*G. C.* 1894, xvi., 34.) Compositæ. G. Allied to *S. anteuphorbium*, but with smaller flower heads and flat obovate-cuneate leaves. Abyssinia. (Dammann & Co.)

***Senecio laxifolius,** Buchanan. (*B. M.* t. 7378; *G. C.* 1894, xvi., fig. 43 (as *S. latifolius*.) H. A small much branched shrub with leathery oblong leaves 2 in. long, green above, glaucous beneath; flowers in erect terminal panicles, yellow. New Zealand. (W. E. Gumbleton.)

Serrastylis modesta, Rolfe. (*K. B.* 1894, p. 158; *G. C.* 1894, xvi., 726, fig. 91.) Orchideæ. S. A new genus allied to Brassia, with the habit of Trichopilia. Pseudobulbs linear oblong, monophyllous; leaves broadly lanceolate, raceme drooping, 5 in. long, clothed with numerous brown and yellow flowers an inch in diameter. Colombia. (Major Joicey and Sir Trevor Lawrence.)

***Sesbania exasperata,** H. B. K. (*B. M.* t. 7384.) Leguminosæ. G. A shrub 8–10 feet high with slender branches, pinnate leaves 6–10 in. long and short racemes of large pea-shaped flowers coloured golden yellow, with spots of red on the back of the standard. Trop. America. (Kew.)

Sicana atropurpurea, André. (*R. H.* 1894, 108, t.) Cucurbitaceæ. G. This differs from *S. odorifera*, Naudin, in having purple-violet fruits. Paraguay. (André, Lacroix, Touraine, France.)

Sobralia macrantha, Lindl. var. **Hodgkinsoni,** Rolfe. (*O. R.* 1894, 236.) Orchideæ. G. A beautiful variety with large rosy lilac flowers, the lip being brilliant rose-purple and orange. (F. Sander & Co.)

***Sobralia sessilis,** Lindl. (*B. M.* t. 7376.) S. Described by Dr. Lindley in 1841, but not known in cultivation till now, the plant hitherto cultivated and figured in *Bot. Mag.* t. 4570, under this name being *S. decora*, Batem. The true *S. sessilis* has stems 2–4 ft. high with red tubercles at the base, ovate-lanceolate leaves, green above, purplish beneath, and sessile flowers 3 in. across, rose red, the lip crimson. British Guiana. (Kew.)

***Sobralia Veitchii.** (*G. C.* 1894, xvi., 103.) G. A garden hybrid between *S. xantholeuca* and *S. macrantha*. (J. Veitch & Sons.)

***Solanum mors elephantum,** Hort. (*W. G.* 1894, 29, fig. 7.) Solanaceæ. G. A bush about a yard high with dark green violet-stalked lyrate leaves and bright blue flowers followed by large depressed globose canary-yellow fruits. Tropical Africa. (Dammann & Co., Naples.)

***Solanum muticum,** N. E. Br. (*K. B.* 1894, 6; *Gfl.* 1894, 170, t. 1401.) G. A handsome species similar in habit to *S. lentum*. Flowers violet blue, fruits reddish, about the size of a hazel nut. A bush attaining a height of 4½ ft. A plant cultivated about a score years ago in England, but since then lost until re-introduced a year or two ago. Paraguay. (Dammann & Co., Naples.)

Solanum texanum, Dun., var. **ovigerum,** Hort. (*Vilmorin Cat.* 1894, 13, fig.; *Jard.* 1894, 29, fig. 11.) G. A half-shrubby perennial with the habit of *S. texanum*, but with ovoid fruits as large as an egg, bright red when ripe. (Vilmorin, Andrieux, & Co., Paris.)

Sophrocattleya eximea. (*G. C.* 1894, xvi., 378.) Orchideæ. G. A garden hybrid between *Sophronitis grandiflora* and *Cattleya bowringiana*. (J. Veitch & Sons.)

Sophrocattleya Læta. (*G. C.* 1894, xvi., 447; *O. R.* 1894, 333, as *Sophro-Lælia*.) G. A garden hybrid between *Sophronitis grandiflora* and *Lælia pumila* var. *dayana*. (J. Veitch & Sons.)

***Spathoglottis gracilis,** Rolfe. (*B. M.* t. 7366.) Orchideæ. S. This plant is grown in gardens for *S. aurea*, Lindl., which it resembles in every character except in having a broader lobed and differently formed lip. The flowers are 2 in. wide, bright yellow, with a few streaks of red on the inside of the lip. Borneo. (F. Sander & Co.)

***Stanhopea nigripes,** Rolfe. (*K. B.* 1894, 364.) Orchideæ. S. A new species, allied to *S. Wardii*, which it resembles in all characters except the lip; sepals and petals yellow, with many small purple blotches and a pair of black eye-like spots on the hypochil, the cavity being also black. Habitat not known. (Kew.)

Stapelia albicans, Sprenger. (*W. G.* 1894, 235, fig. 29.) Asclepiadeæ. G. An albino form of *S. angulata*, Todaro. (Dammann & Co., Naples.)

Stapelia Scylla, Sprenger. (*W. G.* 1894, 234, fig. 30.) G. A form similar to *S. variegata*, but with spots confluent into longitudinal stripes. Origin not recorded. (Dammann & Co., Naples.)

Stauropsis philippinensis, Lindley. (*O. R.* 1894, 308.) Orchideæ. S. Described in 1845, but only now introduced into cultivation. Stem erect, climbing, with elliptical oblong leaves 1½ in. long; flowers 1 in. across solitary from axils of leaves, sepals and petals red-brown, lip purple and white, with a hairy keel. Philippines. (G. E. Day).

***Stenospermatium multiovulatum,** N. E. Br. (*G. C.* 1894, xv., 683.) Aroideæ. S. By far the finest species of the genus. Stems 3–6 ft. high, leaf blade oblong, 12 in. by 5 in., with a petiole 6 in. long. Peduncle 12–18 in. long, spathe 6 in., white. Colombia. Syn. *S. spruceanum* var. *multiovulatum*, Engler. (F. Sander & Co., and Kew.)

***Sterculia austro-caledonica,** Hook. f. (*B. M.* t. 7382.) Sterculiaceæ. S. An erect unbranched tree 10 ft. or more high, with a terminal crown of large palmately lobed leaves and lateral racemes springing from the old part of the trunk; flowers numerous, ½ in. diameter, deep red shaded with orange. Syn. *S. neocaledonica,* Hort. New Caledonia. (Kew.)

Streptocarpus lichtensteinensis. (*G. C.* 1894, xvi., 510.) Gesneriaceæ. S. A garden hybrid, between *S. Wendlandii* and *S. Watsoni.* (Lauche, Moravia.)

***Strophanthus petersianus,** Klotzsch, var. **grandiflorus.** (*B. M.* t. 7390.) Apocynaceæ. S. A climbing evergreen shrub with ovate undulate leaves 3–5 in. long and terminal clusters of erect bell-shaped red and yellow flowers, the corolla lobes drooping and lengthened into twisted tails 8 in. long. Delagoa Bay. (Kew.)

Syringa vulgaris, L. var. **chamæthyrsus,** André. [*R. H.* 1894, 370, figs. 137, 138.) Oleaceæ. H. A dwarf monstrous form of the common lilac. (Machet et Josem, Châlons, Marne, France.)

***Tamarix hispida,** Willd. (*R. H.* 1894, 352, t.) Tamariscineæ. This is the correct name of the plant mentioned in List of New Garden Plants for 1893 under the name of *T. kashgarica.*

***Thomsonia nepalensis,** *Wall.* (*B. M.* t. 7342.) Aroideæ. S. An Amorphophallus-like plant, having a large tuberous rootstock, an annual leaf 2 ft. high with a trisect pinnatifid blade 2 ft. across and an erect scape 4 ft. high, bearing a greenish-yellow boat-shaped spathe nearly a foot long, and an erect yellow spadix nearly as long as the spathe. Himalaya. (Kew.)

***Thunia brymeriana,** Rolfe. (*K. B.* 1894, 156; *R.* t. 82.) Orchideæ. S. A new species, allied to *T. marshalliana;* stems 2 ft. high, leaves 9 in. long; flowers in terminal drooping heads, large, white, the lip yellow with radiating crimson lines. Burma. (F. Sander & Co.)

Thunia veitchiana var. **superba.** (*G. C.* 1894, xvi., 49.) A garden hybrid between *T. veitchiana* and *T. Bensoniæ.* (J. Veitch & Sons.)

Tigridia violacea, Schiede. (*G. M.* 1894, 324; *B. M.* t. 7356.) Irideæ. H. H. A species with linear leaves and violet coloured flowers, with deeper markings. Mexico.

***Todea Moorei.** Baker. (*G. C.* 1894, xv., 526.) Filices. G. Described as a dwarf tree fern from Lord Howe's Island. It is apparently identical with *T. grandipinnula* (*G. C.* 1886, xxv., 752). (W. Bull.)

***Trichocentrum Hartii,** Rolfe. (*K. B.* 1894, 395.) Orchideæ. S. A new species allied to *T. fuscum;* leaves fleshy oblong 2 in. long; scape 1 in. long; flowers 1 in. in diameter, light yellow, the lip white and red-brown. Venezuela. (Kew.)

***Trichocladus grandiflorus,** Oliver. (*G. C.* 1894, xvi., 134.) Hamamelideæ. G. A handsome tree, 20 ft. high, with lanceolate green leaves 6 in. long, and short clusters of white flowers with strap-shaped petals an inch long. The genus is allied to the Witch Hazels. S. Africa. (Kew.)

***Trichopus zeylanicus,** Gærtn. (*B. M.* t. 7350.) Dioscoreaceæ. S. A dwarf plant with a woody rootstock, from which spring numerous short wiry trigonous stems each bearing a cordate lanceolate leaf 2½ in. long, and several star-shaped purple flowers on slender stalks; fruit trigonous, winged. S. India and Ceylon. (Kew.)

Trichosma suavis, Lindl., var. **meulenaereana,** Cogn. (*J. O.* 1894, 330.) Orchideæ. G. This differs from the type in the lip not having a large yellow blotch and in being strongly lined with violet purple instead of red-brown. (M. Arm. de Meulenaere, Ghent.)

***Trigonidium latifolium,** Lindley. (*O. R.* 1894, 271.) Orchideæ. S. First described in 1837, but now only introduced into cultivation. It has oblong acute leaves, 6 in. long and 2 in. broad; sepals and petals yellow and purple; lip with a fleshy yellow front lobe and narrow purplish side lobes. Brazil. (H. M. Purchas.)

***Trochodendron aralioides,** S. & Z. (*B. M.* t. 7375; *G. C.* 1894, xv., 725, fig. 91.) Magnoliaceæ. G. An evergreen shrub with the habit of Heptapleurum; leaves ovate 3–4 in. long shining green; flowers in erect terminal sessile racemes, star-like, green ¾ in. in diameter. Japan. (J. Veitch & Sons.)

Tulipa chrysantha, Boiss. (*B. T. O.* 1894, 230.) Liliaceæ. H. A species with scented yellow flowers, unspotted at the base. Persia, &c. (Dammann & Co.)

Tulipa Levieri, Spr. (*B. T. O.* 1894, 230.) H. Perhaps a form of *T. montana.* Leaves glaucous, flowers large, scarlet, with a basal blotch, black, margined with golden yellow. Persia. (Dammann & Co., Naples.)

Tulipa polychroma, Stapf. (*B. T. O.* 1894, 230.) H. A dwarf species nearly allied to *T. celsiana* and *T. stellata.* Persia. (Dammann & Co.)

Tulipa Sprengeri, *Baker.* (*G. C.* 1894, xv., 716.) H. A species resembling *T. Haageri*, without the black blotch inside. The filaments are also hairless and narrowed at the base. Armenia. (Dammann & Co., Naples.)

Tulipa sultanabadensis, Sprenger. (*B. T. O.* 1894, 230.) H. Nearly allied to *T. undulatifolia.* Flowers large, brilliant scarlet, with black unbordered blotch at base of segments inside. Persia. (Dammann & Co.)

***Tulipa violacea,** Boiss. & Buhse. (*B. T. O.* 1894, 231.) H. A species with bright mauve red flowers, with a black blotch bordered with white at the base inside. Persia. (Max Leichtlin, Baden.)

Tylophoropsis yemensis, N. E. Br. (*G. C.* 1894, xvi., 244.) Asclepiadeæ. G. A new genus of no horticultural interest. It has twining stems, ovate lanceolate leaves 2 in. long and small dull purple flowers in umbel-like cymes. Yemen. (Dammann & Co.)

Ulmus compestris, Sm. var. **globosa,** Behnsch. (*Spaeth Cat.* 1894–5.) Urticaceæ. H. A distinct elm with leaves like those of *U. campestris* var. *Berardi* but of globular habit. (Spaeth, Berlin.)

Vanda Charlesworthii, Rolfe. (*O. R.* 1894, 323.) Orchideæ. S. A supposed natural hybrid between *V. caerulea* and *V. Bensoni.* Flowers 2½ in. across, texture as in *V. caerulea* but veined and marbled with rosy purple; lip as in *V. Bensoni.* Burma. (Charlesworth & Co.)

Vanda kimballiana, Rchb. f. var. **Lacknerae,** Kränzlin. (*Gfl.* 1894, 561.) S. A form differing from the type in the snow-white flowers with a number of light gold spots at the mouth of the spur. (Lackner, Steglitz.)

Vanda rœblingiana, Rolfe. (*K. B.* 1894, 365.) S. A new species, allied to *V. limbata.* Stem 1 ft. high; leaves linear oblong, recurved 6 in. long; peduncle bearing from two to six flowers 2 in. across, brown and green, the lip white with purple and yellow streaks; the apex dilated into a pair of halbert-shaped lobes. Malaya. (H. Low & Co.)

Vanda tricolor, Ldl. var. **Lewisii.** (*G. C.* 1894, xv., 494.) S. A variety with light coloured flowers neatly spotted with red-brown. (W. L. Lewis & Co.)

Vigna strobilophora, Rob. (*G. and F.* 1894, vii., 153, fig. 80.) Leguminosæ. G. A climber with woody stems, pinnately trifoliate leaves and Wistaria-like purple and white flowers. Mexico.

Vriesia Aurora. (*R. H. B.* 1894, 28.) Bromeliaceæ. S. A garden hybrid between *V. morreniana* and *V. Warmingi.*

Vriesia Aurora var. **major.** (*R. H. B.* 1894, 28.) S. A garden hybrid between *V. Warmingi* and *V. psittacina.*

Vriesia Closoni. (*R. H. B.* 1894, 28.) S. A garden hybrid between *V. Barilleti* and *V. morreniana.* (Moens, Lede, Belgium.)

Vriesia crousseana. (*R. H. B.* 1894, 28.) S. A garden hybrid between *V. amethystina* and *V. Warmingi.*

Vriesia gracilis. (*R. H. B.* 1894, 28.) S. A garden hybrid between *V. Warmingi* and *V. amethystina.*

Vriesia Rex. (*R. H. B.* 1894, 217, t.) S. A garden hybrid between *V. Morreno-Barilleti* and *V. cardinalis.* (Duval, Versailles.)

Vriesia Wioti. (*R. H. B.* 1894, 28.) S. A garden hybrid between *V. psittacina* and *C. Barilleti.* (Kittel, Eckersdorf.)

***Widdringtonia Whytei,** Rendle. (*G. C.* 1894, xv., 746.) Coniferæ. G. The Milanji Cypress which forms forests on the mountains of Nyassaland, growing to a height of 140 ft. It has Juniper-like leaves and cones smaller than a chestnut. (Kew.)

***Weldenia candida,** Schult. (*K. B.* 1894, 135; *B. M.* t. 7405.) Commelinaceæ. G. Root a fleshy tuber, bearing annually six or eight strap-shaped leaves with folding bases, flowers 1 in. dia., snow white, single on erect scapes in a cluster in the centre of the leaves. Mexico and Guatemala. (Kew.)

Zygopetalum intermedium, Lodd. var. **peruvianum,** Rolfe. (*L.* t. 418.) Orchideæ. G. A variety with smaller flowers than the type. Peru. (L'Horticulture Internationale.)

Zygopetalum Perrenoudi. (*J. O.* 1894, 42.) G. A garden hybrid between *Z. intermedium* and *Z. Gautieri.*

Zygopetalum Lindeniæ, Rolfe. (*L.* t. 275; *O. R.* 1894, 270.) S. A new species, allied to *Z. rostratum*, differing in having a white lip closely striped with purple, the sepals and petals being greenish with obscure purple-brown veins. Venezuela. (L'Horticulture Internationale.)

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX III.—1895.

LIST of the STAFFS of the ROYAL GARDENS, Kew, and of Botanical Departments and Establishments at Home, and in India and the Colonies, in Correspondence with Kew.

* Trained at Kew. † Recommended by Kew.

Royal Gardens, Kew :—

Director	W. T. Thiselton-Dyer, C.M.G., C.I.E., F.R.S., Ph.D., M.A., F.L.S.
Assistant-Director	Daniel Morris, C.M.G., D.Sc., M.A., F.L.S.
Assistant (Office)	*John Aikman.
" "	*William Nicholls Winn.

Keeper of Herbarium and Library	John Gilbert Baker, F.R.S., F.L.S.
Principal Assistant (Phanerogams)	*William Botting Hemsley, F.R.S., A.L.S.
" " (Cryptogams)	George Massee, F.L.S.
Assistant (Herbarium)	Nicholas Edward Brown, A.L.S.
" "	*Robert Allen Rolfe, A.L.S.
" "	Charles Henry Wright.
" "	*Sidney Alfred Skan.
" for India	Otto Stapf, Ph.D.

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Honorary Keeper, Jodrell Laboratory	Dukinfield Henry Scott, F.R.S., M.A., Ph.D., F.L.S.

Keeper of Museums	John Reader Jackson, A.L.S.
Assistant (Museum)	John Masters Hillier.
Preparer	George Badderly.

Curator of the Gardens	George Nicholson, A.L.S.
Assistant Curator	William Watson.
Foremen :—	
Arboretum	*William J. Bean.
Herbaceous Department	*Walter Irving.
Greenhouse and Ornamental Department.	Frank Garrett.
Temperate House (Sub-tropical Department).	*Thomas Jones.

Cambridge.—University Botanic Garden :—

Professor	Henry Marshall Ward, M.A., Sc.D., F.R.S., F.L.S.
Curator	*Richard Irwin Lynch, A.L.S.

Dublin.—Royal Botanic Gardens, Glasnevin :—

Keeper	Frederick W. Moore, A.L.S.

Trinity College Botanic Gardens :—

Professor	E. Perceval Wright, M.D., F.L.S., Sec. R.I.A.
Curator	*F. W. Burbidge, M.A., F.L.S.

Edinburgh.—Royal Botanic Garden :—

Regius Keeper	Isaac Bayley Balfour, M.D., D.Sc., F.R.S., F.L.S.
Curator	Robert Lindsay.

Glasgow.—Botanic Gardens :—

University Professor	F. O. Bower, D.Sc., F.R.S., F.L.S.
Curator	*Daniel Dewar.

Oxford.—University Botanic Garden :—

Professor	Sydney H. Vines, D.Sc., F.R.S., F.L.S.
Curator	*William Baker.

COLONIES.

Antigua. (*See* Leeward Islands.)

Barbados.—Dodd's Reformatory, Botanic Station :—

	Superintendent	John R. Bovell, F.C.S.

British Guiana.—Botanic Gardens :—

Georgetown	Superintendent and Government Botanist	*George S. Jenman, F.L.S.
	Head Gardener	†John F. Waby.
	Second ,,	*Robert Ward.
	Promenade Garden :—	
	Head Gardener	William Jackson.
Berbice	Keeper	Richard Hunt.

British Honduras.—Botanic Station :—

	Curator	†James McNair.

Canada.—

Ottawa	Dominion Botanist	Prof. John Macoun, M.A., F.R.S.C., F.L.S.
	Assistant ,,	Jas. M. Macoun.
	Director of Government Experimental Farms	Prof. Wm. Saunders, F.R.S.C., F.L.S.
	Botanist and Entomologist.	James Fletcher, F.L.S.
Montreal	Director, University Botanic Garden.	Prof. D. P. Penhallow, B.Sc.

Cape Colony.—

	Government Botanist	Prof. MacOwan, F.L.S.

Ceylon.—Department of Royal Botanic Gardens :—

	Director	†Henry Trimen, M.B., F.R.S., F.L.S.
Peradeniya	Head Gardener	*Hugh McMillan.
	Clerk	J. Ferdinandus.
	Draughtsman	W. de Alwis.
Hakgala	Superintendent	*William Nock.
	Clerk and Foreman	M. G. Perera.
Henaratgoda	Conductor	S. de Silva, Arachchi.
Anuràdhapura	,,	D. F. de Silva.
Badulla	,,	D. A. Guneratne.

Dominica. (*See* Leeward Islands.)

Falkland Islands.—Government House Garden :—

	Head Gardener -	*Albert Linney.

Fiji.—Botanic Station :—

	Curator - -	*Daniel Yeoward.

Gambia.—Botanic Station :—

	Curator - -	*Walter Haydon.

Gold Coast.—Botanic Station :—

	Curator - -	*Charles Henry Humphries.

Grenada.—Botanic Garden :—

	Curator - -	*Walter E. Broadway.

Hong Kong.—Botanic and Afforestation Department :—

	Superintendent -	†Charles Ford, F.L.S.
	Assistant Superintendent.	*W. J. Tutcher.

Jamaica.—Department of Public Gardens and Plantations :—

	Director - -	†William Fawcett, B.Sc., F.L.S.
Hope Gardens -	Superintendent -	*William Cradwick.
Castleton Garden	„ -	*William J. Thompson.
Cinchona (Hill Garden).	„ -	*William Harris.
Kingston Parade Garden.	„ -	John Campbell.
King's House Garden.	„ -	Eugene Campbell.
Bath - -	Overseer - -	W. Groves.

Lagos.—Botanic Station :—

	Curator - -	*Henry Millen.
	Assistant - -	*F. G. R. Leigh.
	„ - -	*T. B. Dawodu.

Leeward Islands.—Botanic Stations :—

Antigua - -	Curator - -	*Arthur G. Tillson.
Dominica -	„ - -	*Joseph Jones.
Montserrat -	Head Gardener -	Henry Maloney.
St. Kitts-Nevis -	„ „ -	Joseph Wade.

Malta.—Argotti Botanic Garden :—

	Director - -	Dr. Francesco Debono.

Mauritius.—Department of Forests and Botanic Gardens :—

Pamplemousses -	Director - -	*William Scott.
	Assistant Director of Gardens.	J. Vankeirsbilck.
	Overseer - -	J. Powell.
	Assistant Director of Forests.	P. Randabel.
Curepipe - -	Overseer - -	F. Bijoux.
Reduit - -	„ - -	W. A. Kennedy.

Montserrat. (*See* Leeward Islands.)

Natal.—Botanic Gardens :—

Durban - -	Curator - -	John Medley Wood, A.L.S.
	Head Gardener -	*James Wylie.
Pietermaritzburg	Curator - -	G. Mitchell.

New South Wales.—Botanic Gardens :—		
Sydney	Director	Charles Moore, F.L.S.
Department of Agriculture and Forests :—		
	Consulting Botanist	J. H. Maiden, F.L.S.
New Zealand :—		
Wellington.—Colonial Botanic Garden :—		
	Director	Sir James Hector, K.C.M.G., F.R.S.
	Head Gardener	G. Gibb.
Dunedin	Superintendent	J. McBean.
Napier	„	W. Barton.
Invercargill	Head Gardener	Thomas Waugh.
Auckland	Ranger	William Goldie.
Christchurch	Head Gardener	*Ambrose Taylor.
Niger Coast Protectorate.—Botanic Garden :—		
Old Calabar	Curator	Horace W. L. Billington
Queensland.—Botanic Department :—		
Brisbane	Colonial Botanist	F. M. Bailey, F.L.S.
Botanic Gardens :—		
	Curator	*Philip MacMahon.
	Overseer	J. Tobin.
Acclimatisation Society's Gardens :—		
	Secretary and Manager	Wm. Soutter.
	Assistant „	A. Humphrey.
Rockhampton	Superintendent	J. S. Edgar.
St. Kitts-Nevis. (*See* Leeward Islands.)		
St. Lucia.—Botanic Station :—		
	Curator	*John Chisnall Moore.
St. Vincent.—Botanic Station :—		
	Curator	*Henry Powell.
Sierra Leone.—Botanic Station :—		
	Curator	*Frederick Enos Willey.
South Australia.—Botanic Gardens :—		
Adelaide	Director	Maurice Holtze, F.L.S.
Port Darwin	Curator	Nicholas Holtze.
Straits Settlements.—Gardens and Forest Department :—		
Singapore	Director	†H. N. Ridley, M.A., F.L.S.
	Assistant Superintendent.	*Walter Fox.
Penang	Assistant Superintendent	†Charles Curtis, F.L.S.
Perak (Kuala Kangsar).—Government Plantations :—		
	Superintendent	Oliver Marks.
Tasmania.—Botanic Gardens :—		
Hobart Town	Superintendent	F. Abbott.
Trinidad.—Royal Botanic Gardens :—		
	Superintendent	†John H. Hart, F.L.S.
	Assistant „	*William Lunt.
Victoria.—		
Melbourne	Government Botanist	Sir F. Von Mueller, K.C.M.G., F.R.S., F.L.S.
Botanic Gardens :—		
	Curator	W. R. Guilfoyle, F.L.S.

INDIA.

Botanical Survey.—Director, George King, M.D., LL.D., C.I.E., F.R.S., F.L.S.

Bengal, Assam, Burma; the Andamans and Nicobars; North-East Frontier Expeditions:—

Superintendent of the Royal Botanic Gardens, Calcutta	George King, M.D., LL.D., C.I.E., F.R.S., F.L.S.

Bombay, including Sind:—

———	———

Madras: the State of Hyderabad and the State of Mysore:—

Government Botanist and Director of Cinchona Plantations	†M. A. Lawson, M.A., F.L.S.

North-Western Provinces and Oudh; the Punjab; the Central Provinces; Central India; Rajputana; North-West Frontier Expeditions:—

Director of the Botanic Department Northern India, Saharanpur, N.W.P.	†J. F. Duthie, B.A., F.L.S.

Bengal.—Department of Royal Botanic Gardens:—

Calcutta (Seebpore)	Superintendent	George King, M.D., LL.D., C.I.E., F.R.S., M.B., F.L.S.
	Curator of Herbarium	David Prain, M.B., F.L.S., F.R.S.E.
	" Garden	*G. T. Lane.
	Assistant "	*H. J. Davies.
Mungpoo	Superintendent, Government Cinchona Plantations	George King, M.D., LL.D., C.I.E., F.R.S., F.L.S.
	Deputy "	*J. A. Gammie.
	1st Assistant	*R. Pantling.
	2nd "	*Joseph Parkes.
	3rd "	G. A. Gammie.
	4th "	*Amos Hartless.

Darjeeling; Lloyd Botanic Garden:—

Curator	*William A. Kennedy.

Darbhangah; Maharajah's Garden:—

Superintendent	Herbert Thorn.

Bombay.—

Poona	———	———
	Lecturer on Botany	*G. Marshall Woodrow.

Ghorpuri.—Botanic Garden:—

Superintendent	A. R. Lester.

Bombay.—Municipal Garden:—

Superintendent	C. D. Mahaluxmivala.

Karachi.—Municipal Garden:—

Superintendent	*William Strachan.

Central Provinces.—

Nagpur	Superintendent of Public Gardens.	*J. Horne Stephen.

Madras.—Botanic Department :—

Ootacumund	Government Botanist and Director of Government Gardens, Parks, and Cinchona Plantations	†M. A. Lawson, M.A., F.L.S.
	Curator of Gardens and Parks.	*Robert L. Proudlock.

Madras.—Agri-Horticultural Society :—

	Hon. Secretary	Col. H. W. H. Cox.
	Superintendent	*J. M. Gleeson.

Native States.—

Mysore (Bangalore)	Superintendent	*J. Cameron, F.L.S.
	Curator	
Baroda	Superintendent	*G. H. Krumbiegel.
	„ New Works	*J. M. Henry.
Gwalior	„	†C. Maries, F.L.S.
Morvi	„	*Joseph Beck.
Travancore(Trivandrum)	„	*Frederick James Ingleby.
Udaipur	„	T. H. Storey.

North-West Provinces.—

Agra (Taj Garden)	Superintendent	F. J. Bullen.
Allahabad	„	*J. Phillips.
Cawnpur	„	G. H. T. Mayer.
Kumaon (Ramghur)	„	*F. W. Seers.
Lucknow	„	*Matthew Ridley.
Saharanpur and **Branch Garden, Mussoorie.**	„	William Gollan.

Punjab.—

Lahore	Superintendent	H. G. Hein.
Simla	„	*A. Parsons.